

Ecological Impact Assessment Report

**Zulani Agricultural Development,
Douglas, Northern Cape Province**

June 2018

Compiled for:



Compiled by:

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Executive Summary

The project applicant, Idstone Farming (Pty) Ltd proposes to develop a natural area of virgin soil for agricultural purposes. The proposed development will entail the cultivation of 17 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 765 ha. The purpose of the cultivation will be for commercial planting and harvesting of potatoes.

Eco-Con Environmental was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process.

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

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

A site visit/assessment for the proposed development footprint area was conducted on 20 July 2017. This date forms part of the winter season and it must therefore be noted that the seasonal time of the assessment was not necessarily favourable for successful identification of plant species individuals. 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. This will ensure that no provincially protected or significant species have potentially been omitted.

Methodology

The proposed project footprint area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present. Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the Northern Cape Nature Conservation Act (Act 9 of 2009). Georeferenced photographs were taken of ecologically sensitive areas as well as the relevant nationally or

provincially protected species encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

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

Study area

The assessment area consists of a single surface footprint area of approximately 1850 ha in total size and is situated on the Remaining Extent of the Farm Zulani no 167 (SG 21 Digit Code: C03700000000016700000). The proposed development will entail the cultivation of 17 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 765 ha. The proposed Zulani surface footprint area has two development alternatives namely Alternative 1 (preferred) and Alternative 2.

The proposed project footprint area is situated approximately 42 km outside the town of Douglas directly adjacent south of the R 357 provincial road towards the city of Kimberley. The area forms part of the Siyancuma Local Municipality which, in turn forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. The area falls outside the municipal urban edge. Access is obtained by way of the R 357 and branch off roads.

According to SANBI (2006-), the entire proposed Zulani surface footprint area falls within the Kimberley Thornveld vegetation type (SVk 4) which is characterised by slightly irregular plains with a well-developed woody component (tree and shrub layer). The herbaceous layer is usually open with much uncovered soils.

This vegetation type is classified as least threatened because of its broad distributions and it being mostly excluded from being utilised for intensive agricultural cultivation activities (SANBI, 2006-).

The northern portion of the proposed Zulani surface footprint area is classified as 'other natural area' in accordance with the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCSBP). The south-western portion however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or

ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017).

Results and Conclusion

The proposed development will in all probability completely transform the existing surface vegetation on the proposed Zulani surface footprint area. The area forms part of a broad, continuous surrounding savannah landscape mainly associated with the Kimberley Thornveld vegetation type (SVk 4) of which the veld and vegetation is in an undisturbed, natural and relatively pristine condition. The area therefore scored a high PES value.

The dominant tree species present within the footprint area is *Vachellia erioloba* (nationally protected) while the species *Vachellia haematoxylon* (nationally protected) is also well represented. The average density of trees within the footprint area amounts to approximately between 15 trees/ha and 20 trees/ha which equates to a total estimate of approximately 14 400 trees within the footprint area which will need to be removed.

Two active nests of the African white-backed vulture (*Gyps africanus*), which is a critically endangered Red Data Listed species, were encountered atop large *Vachellia* trees. The separate Avifaunal Impact Assessment conducted for the proposed project, indicted the presence of six active nests. It is however highly likely that there are more active nests present in the area as the larger area provides important foraging grounds. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area.

The northern development portion of the proposed Zulani surface footprint area is classified as 'other natural area' in accordance with the NCSBP. The southern development portion however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017). The area forms part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. The Ecological Importance and Sensitivity (EIS) of the proposed project area is therefore classified as Class B (high) as it is ecologically important and sensitive on provincial and national scale for the persistence of the CBA 2 ecological corridor and due to the significant presence of nationally protected tree species and the presence of the critically

endangered African white-backed vulture. The area is considered to be of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, CBA 2 and protected/Red Data Listed species.

It is the opinion of the specialist that, by application of the NEMA Mitigation Hierarchy, the significance of residual impacts associated with transformation of the CBA 2 and destruction of nationally protected tree species and critically endangered bird species habitat cannot be suitably reduced and mitigated to within acceptable levels for Alternative 1. This must therefore be seen as a fatal flaw for the proposed Alternative 1 and it is therefore not recommended that Alternative 1 be considered.

Although Alternative 2 will result in the most southerly situated three pivot lands of the southern development portion of the proposed project associated with the CBA 2 being left in situ and therefore not being significantly impacted upon, the significant presence of nationally protected tree species and the presence of the critically endangered African white-backed vulture habitat within Alternative 2 will still pose a significant residual impact. The two most southerly situated pivot lands of Alternative 2 are also associated with the CBA 2 but due to their significant distance away from the Riet River, these two pivot lands are not necessarily regarded as forming an integral part of the ecological corridor associated with the Riet River catchment and riparian zone relative to the three most southerly situated pivot lands.

By application of the NEMA Mitigation Hierarchy, the significance of residual impacts cannot be adequately mitigated to within acceptable levels other than investigating the potential implementation of an ecological offset as mitigation. The only potentially suitable mitigation option would be for the applicant to make available a suitable ecological offset area which can be formally protected in order to compensate for the significant destruction of the CBA 2, nationally protected tree species and nesting sites and foraging grounds of the critically endangered species.

It is recommended that Alternative 2 be considered due to the smaller impact footprint. If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and

strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.

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Abbreviations

CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Ecological Support Area
IBA	Important Bird Area
MAP	Mean Annual Precipitation
MAT	Mean Annual Temperature
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)
SANBI	South African National Biodiversity Institute
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), Eco-Con Environmental, 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, Idstone Farming (Pty) Ltd proposes to develop a natural area of virgin soil for agricultural purposes. The proposed project footprint area is situated approximately 42 km outside the town of Douglas directly adjacent south of the R 357 provincial road towards the city of Kimberley. The area forms part of the Frances Baard District Municipality, Northern Cape Province. The proposed development will entail the cultivation of 17 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 765 ha. The purpose of the cultivation will be for commercial planting and harvesting of potatoes.

Eco-Con Environmental was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process.

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

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

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

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

2. Date and Season of Ecological Walkthrough/Site Assessment

A site visit/assessment for the proposed development footprint area was conducted on 20 July 2017. This date forms part of the winter season and it must therefore be noted that the seasonal time of the assessment was not necessarily favourable for successful identification of plant species individuals. 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. This will ensure that no provincially protected or significant species have potentially been omitted.

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

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

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

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

4. Objectives of the Assessment

Ecological and habitat survey:

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

5. Methodology

- The proposed project footprint area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present.
- Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the Northern Cape Nature Conservation Act (Act 9 of 2009).
- Georeferenced photographs were taken of ecologically sensitive areas as well as the relevant nationally or provincially protected species encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

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

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

Table 1: Criteria for PES calculations

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

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

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

Table 2: Criteria for EIS calculations

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

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

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

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

Extent of Positive or Negative Impact	<p>5 - International: Impact will extend beyond National boundaries.</p> <p>4 - National: Impact will extend beyond Provincial boundaries but remain within National boundaries.</p> <p>3 - Regional: Impact will extend beyond 5 km of the development footprint but remain within Provincial boundaries.</p> <p>2 - Local: Impact will not extend beyond 5 km of the development footprint.</p> <p>1 - Site-specific: Impact will only occur on or within 200 m of the development footprint.</p> <p>0 – No impact.</p>
Irreplaceability of Natural Resources being impacted upon	<p>5 – Definite loss of irreplaceable natural resources.</p> <p>4 – High potential for loss of irreplaceable natural resources.</p> <p>3 – Moderate potential for loss of irreplaceable natural resources.</p> <p>2 – Low potential for loss of irreplaceable natural resources.</p> <p>1 – Very low potential for loss of irreplaceable natural resources.</p> <p>0 – No impact.</p>
Reversibility of Impact	<p>5 – Impact cannot be reversed.</p> <p>4 – Low potential that impact may be reversed.</p> <p>3 – Moderate potential that impact may be reversed.</p> <p>2 – High potential that impact may be reversed.</p> <p>1 – Impact will be reversible.</p> <p>0 – No impact.</p>
Probability of Impact Occurrence	<p>5 - Definite: Probability of impact occurring is > 95 %.</p> <p>4 - High: Probability of impact occurring is > 75 %.</p> <p>3 - Medium: Probability of impact occurring is between 25 % - 75 %.</p> <p>2 - Low: Probability of impact occurring is between 5 % - 25 %.</p> <p>1 - Improbable: Probability of impact occurring is < 5 %.</p>
Cumulative Impact	<p>High: 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>Medium: 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>Low: 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>None: No cumulative impact.</p>

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

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

The maximum Significance Score value is 150.

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

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

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

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

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

In 2005 DWAF published a wetland delineation procedure in a guideline document titled “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas”. Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments. These guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas and is that part of the wetland that remains 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 locating 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 and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. A protective 32 m buffer zone, beginning from the outer edge of the wetland temporary zone, must be implemented and designated as sensitive within which no development must be allowed to occur.

6. Study Area

The assessment area consists of a single surface footprint area of approximately 1850 ha in total size and is situated on the Remaining Extent of the Farm Zulani no 167 (SG 21 Digit Code: C03700000000016700000). The proposed development will entail the cultivation of 17 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 765 ha. The proposed Zulani surface footprint area has two development alternatives namely Alternative 1 (preferred) and Alternative 2.

The proposed project footprint area is situated approximately 42 km outside the town of Douglas directly adjacent south of the R 357 provincial road towards the city of Kimberley. The area forms part of the Siyancuma Local Municipality which, in turn forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. The area falls outside the municipal urban edge. Access is obtained by way of the R 357 and branch off roads.

See locality map below.

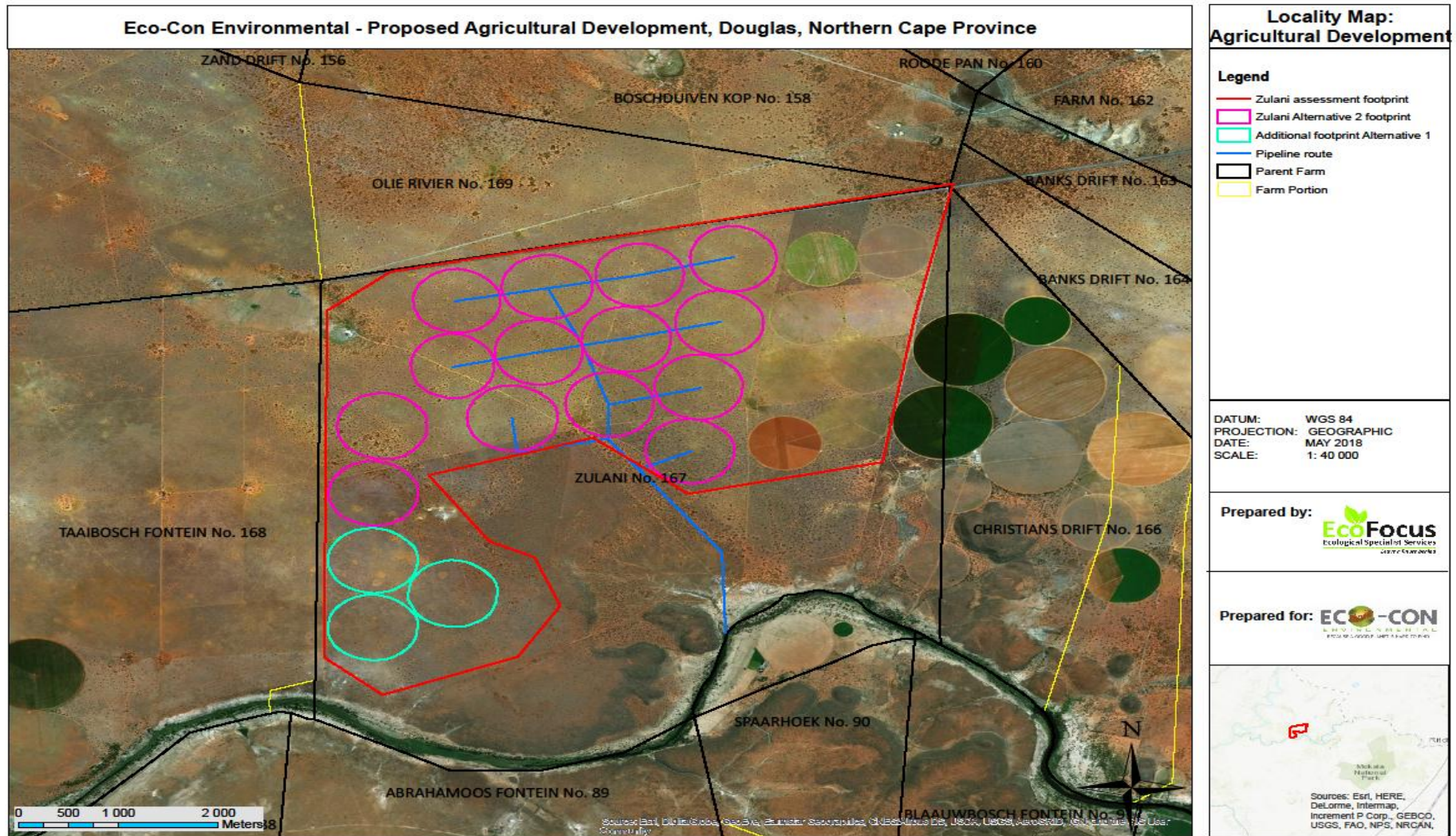


Figure 1: Locality map illustrating the Zulani assessment footprint area as well as the positions of the proposed new centre pivot lands (see A3 sized map in the Appendices)

6.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 334 mm (www.climate-data.org). The maximum average monthly temperature is approximately 26.3°C in the summer months while the minimum average monthly temperature is approximately 9.8°C during the winter. Maximum daily temperatures can reach up to 34.7°C in the summer months and dip to as low as 1.5°C during the winter.

6.2. Geology and Soils

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

The flat to slightly undulating plains are characterised by Andesitic lavas of the Allanridge formation in the northern and western sections of the vegetation type. Deep sandy to loamy soils of the Hutton soil form are mainly present.

The scattered hills within the plains are associated with highly fragmented, extensive dolerite sills which form ridges, plateaus and slopes of the koppies. Rock and boulder covered slopes mainly constitute stony Mispah and gravel-rich Glenrosa soil types.

6.3. Vegetation and Conservation Status

According to SANBI (2006-), the entire proposed Zulani surface footprint area falls within the Kimberley Thornveld vegetation type (SVk 4) which is characterised by slightly irregular plains with a well-developed woody component (tree and shrub layer). The herbaceous layer is usually open with much uncovered soils.

This vegetation type is classified as least threatened because of its broad distributions and it being mostly excluded from being utilised for intensive agricultural cultivation activities (SANBI, 2006-).

The northern portion of the proposed Zulani surface footprint area is classified as 'other natural area' in accordance with the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCSBP). The south-western portion however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or

ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017).

The proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the footprint area.

See vegetation and sensitivity maps below.

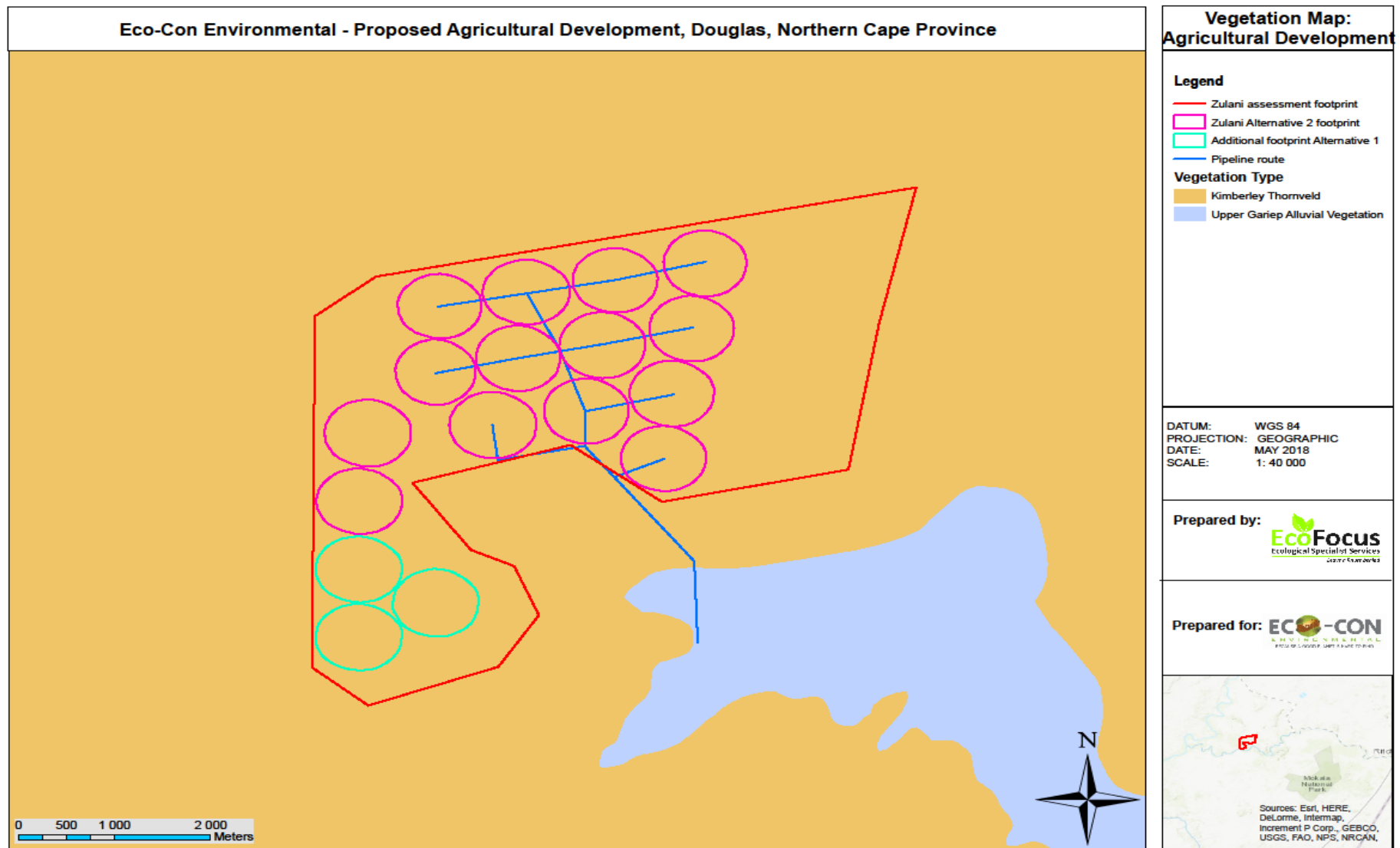


Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area (see A3 sized map in the Appendices)

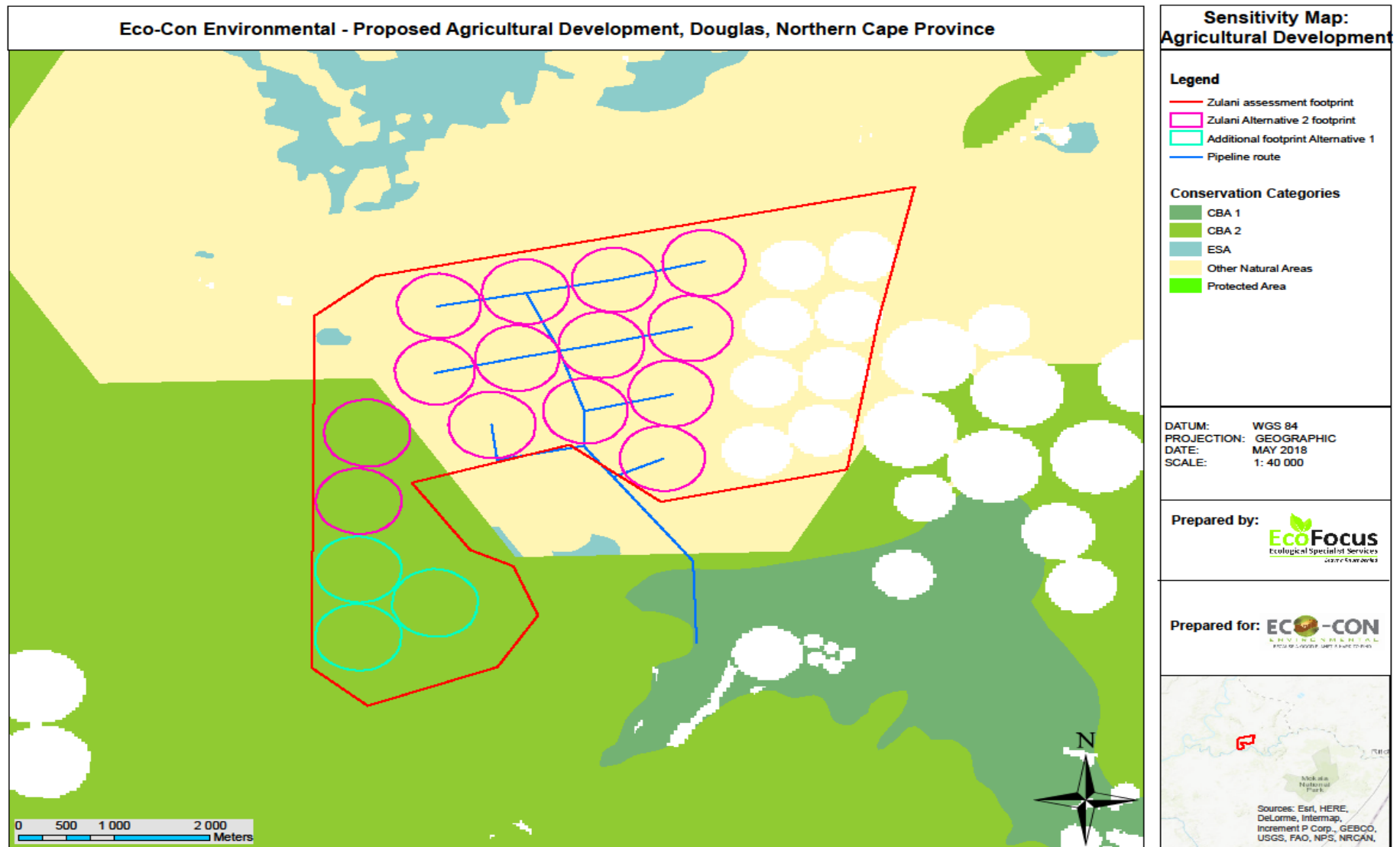


Figure 3: Sensitivity map illustrating the conservation status associated with the assessment area (see A3 sized map in the Appendices)

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 to the ecological specialist was correct and valid at the time that it was provided.
- the proposed project footprint area as provided by the applicant is correct and will not be significantly deviated from as this was the only areas assessed.
- strategic level investigations undertaken by the applicant prior to the commencement of the Environmental Impact Assessment process, determined that the proposed development footprint represent a potentially suitable and technically acceptable location.
- the public, local communities, relevant organs of state and landowners will receive a sufficient reoccurring opportunity to participate and comment on the proposed project during the Environmental Impact Assessment process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the proposed project is based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints.
- the EIA process is a project-level framework and the specialists are limited to assessing the anticipated environmental impacts associated with the construction and operational phases of the proposed project.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making.
- The date on which the site assessment was conducted, forms part of the winter season and it must therefore be noted that the seasonal time was not necessarily favourable for successful identification of plant species individuals. 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. This will ensure that no provincially protected or significant species have potentially been omitted.

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

- Uncertainty of prediction is critical at the data collection phase as observations and conclusions are made, only based on professional specialist opinion. Final certainty will only be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.
- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the EIA process. Continual two way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.
- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed development and the subsequent public reaction/opinion which will be received during the Public Participation Process (PPP).

Gaps in knowledge can be attributed to:

- The ecological study process was undertaken prior to the availing of certain information which would only be derived from the final project design and layout.
- The 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 agricultural development applications are 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 proposed Zulani surface footprint area has two development alternatives namely Alternative 1 (preferred) and Alternative 2. Each alternative will be discussed separately.

8.1. Alternative 1 (preferred); Current Existing Vegetation and Site Condition

Alternative 1 of the proposed Zulani surface footprint area constitutes 17 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 765 ha. The proposed development will in all probability completely transform the existing vegetation.

8.1.1. Northern development portion associated with 'other natural area'

The surface vegetation associated with the most northerly situated 12 centre pivot lands of approximately 45 ha in size each, consists of a homogenous relatively flat to gently sloping open savannah landscape of which the woody component mainly consists of single stemmed trees. Multi-stemmed trees or shrubs are however also present in relatively high numbers. The area forms part of a broad, continuous surrounding savannah landscape associated with the Kimberley Thornveld vegetation type (SVk 4) of which the veld and vegetation is in a natural, relatively pristine condition. Significant numbers of agricultural cultivation developments are present within the broader surrounding areas but are mainly restricted to around the Riet River system. The soils of the area mainly constitute deep sandy red soils with a low rocky coverage which is representative of the relevant vegetation type.

The dominant tree species present is *Vachellia erioloba* (nationally protected) while the tree species *Vachellia haematoxylon* (nationally protected) is also present but to a significantly lesser extent. The average density of trees within the footprint area amounts to approximately 20 trees/ha which equates to a total estimate of approximately 10 800 trees within the footprint area which will need to be removed. Shrubs found to be present mostly include *Vachellia erioloba* (nationally protected) and *Vachellia haematoxylon* (nationally protected). The species *Vachellia tortilis*, *Senegalia mellifera*, *Ziziphus mucronata*, *Grewia flava*, *Asparagus spp.*, *Ehretia rigida*, *Tarchonanthus camphoratus* and *Rhigozum trichotomum* are present in low numbers. Forbs include *Crotalaria orientalis*, *Felicia spp.*, *Eriocephalus aspalathoides*, *Chrysocoma obtusata*, *Acrotome inflata*, *Helichrysum obtusum* and *Oxalis semiloba* (provincially protected). *Drimia spp.* are also expected to be present in accordance with information received from the applicant. Only the species *Drimia nana* is however provincially specially protected. The grass layer is dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana*, *Aristida diffusa* and *A. congesta*. Other grasses include *Heteropogon*

contortus, *Enneapogon cenchroides*, *Pogonarthria squarrosa*, *Stipagrostis obtusa* and *Eragrostis obtusa*.



Figure 4: Image illustrating the landscape of the northern development portion

With the exception of the two nationally protected tree species and provincially protected species *Oxalis semiloba*, no Red Data Listed or other provincially protected or any other plant species of conservational significance were found to be present within this portion of the proposed project area. It is however recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted.

Although the proposed Zulani surface footprint area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important bird areas/iba-map](http://www.birdlife.org.za/conservation/important%20bird%20areas/iba-map)), two active nests of the African white-backed vulture (*Gyps africanus*), which is a critically endangered Red Data Listed species, were encountered atop large *Vachellia* trees. The separate Avifaunal Impact Assessment conducted for the proposed project, indicted the presence of six active nests. It is however highly likely that there are more active nests present in the area as the larger area provides important foraging grounds. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area. Although no snakes were encountered due to the timing of the site visit, these nests often also house various snake species which feed on the chicks and adult birds. No other unique or important habitats for nesting sites where observed.



Figure 5: Image illustrating the presence of active nests of the critically endangered African white-backed vulture (*Gyps africanus*)

Signs of mammals traversing the area, such as the common warthog (*Phacochoerus africanus*), duiker (*Sylvicapra grimmia*) and steenbok (*Raphicerus campestris*) which are all provincially protected are evident. This subsequently means that various meso-predators are also highly likely to be present. These species naturally utilise the area for breeding and/or persistence habitat but, their mobility and the broad, continuous surrounding savannah landscape allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.

The Present Ecological State (PES) of the northern development portion is classified as Class B as it is largely natural. A small change in natural habitats and biota may have taken place due to the 'ecological edge effect' caused by the adjacently located cultivated pivot lands, the R 357 provincial road and anthropogenic farm management practises but the ecosystem functionality has remained essentially unchanged.

The portion forms part of the Kimberley Thornveld vegetation type (SVk 4) which is classified as least threatened (SANBI, 2006-) and the area is also classified as 'other natural area' in accordance with the NCSBP. The Ecological Importance and Sensitivity (EIS) of the northern development portion is however classified as Class B (high) as it is ecologically important and sensitive on national scale due to the significant presence of nationally protected tree species and the presence of the critically endangered African white-backed vulture. The area is considered to be of high conservational significance for habitat preservation and ecological functionality persistence in support of the

surrounding ecosystem, broader vegetation type and protected/Red Data Listed species. Biodiversity is however still relatively ubiquitous due to the vast and homogenous surrounding landscape.

8.1.2. Southern development portion associated with a Critical Biodiversity Area two (CBA 2)

The surface vegetation associated with the most southerly situated 5 centre pivot lands of approximately 45 ha in size, is more heterogeneous compared to the northern development portion. It consists of a gently to moderately sloping rocky landscape to the north and east due to the presence of a ridge/hill associated with the Vaalbos Rocky Shrubland vegetation type (SVk 5). The soils become increasingly rockier and loamier in this area.

Due to this variation in soil conditions from the dominant deep sandy red soils, the density of the woody component increases significantly within this area. Although single stemmed trees such as *Vachellia erioloba* (nationally protected) and *Vachellia haematoxylon* (nationally protected) are still present in high numbers, their dominance is reduced and replaced by an increase in density of multi-stemmed shrubs and trees such as *Senegalia mellifera*, *Vachellia tortilis*, *Ziziphus mucronata* and *Grewia flava*. Approximately ten individuals of the nationally protected tree species *Boscia albitrunca* were also found to be present within the rocky areas. None of these individuals are to be removed during any development process without the required national and provincial flora permits being obtained. The shrub species *Asparagus spp.*, *Ehretia rigida*, *Tarchonanthus camphoratus* and *Rhigozum trichotomum* are present in low numbers. Forbs include *Crotalaria orientalis*, *Felicia spp.*, *Eriocephalus aspalathoides*, *Chrysocoma obtusata*, *Acrotome inflata*, *Helichrysum obtusum* and *Oxalis semiloba* (provincially protected). *Drimia spp.* are also expected to be present in accordance with information received from the applicant. Only the species *Drimia nana* is however provincially specially protected. The grass layer is dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana*, *Aristida diffusa* and *A. congesta*. Other grasses include *Heteropogon contortus*, *Enneapogon cenchroides*, *Pogonarthria squarrosa*, *Stipagrostis obtusa* and *Eragrostis obtusa*.



Figure 6: Image illustrating the increased woody density towards the ridge/hills area as well as the presence of the provincially protected species *Boscia albitrunca*

The most southerly area of this portion however has a relatively sparse woody component and rather constitutes gently to moderately sloping open bottomland sparse savannah. The soils also constitute deep sandy red soils with a low rocky coverage. The woody component consists of mixture of small, single stemmed trees and multi-stemmed shrubs. The area forms part of a broad, continuous surrounding savannah landscape associated with the Kimberley Thornveld vegetation type (SVk 4) of which the veld and vegetation is in a natural, relatively pristine condition. It does not intrude into the sensitive riparian zone associated with the Rite River.

The dominant tree/shrub species present is *Vachellia haematoxylon* (nationally protected) while the tree species *Vachellia erioloba* (nationally protected) is also present but to a significantly lesser extent. The average density of trees within this portion amounts to approximately 15 trees/ha which equates to a total estimate of approximately 2700 trees within the footprint area which will need to be removed. Forbs include *Crotalaria orientalis*, *Felicia spp.*, *Eriocephalus aspalathoides*, *Chrysocoma obtusata*, *Acrotome inflata*, *Helichrysum obtusum* and *Oxalis semiloba* (provincially protected). *Drimia spp.* are also expected to be present in accordance with information received from the applicant. Only the species *Drimia nana* is however provincially specially protected. The grass layer is dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana*, *Aristida diffusa* and *A congesta*. Other grasses include *Heteropogon contortus*, *Enneapogon cenchroides*, *Pogonarthria squarrosa*, *Stipagrostis obtusa* and *Eragrostis obtusa*.



Figure 7: Image illustrating the landscape of the open bottomland sparse savannah

With the exception of the three nationally protected tree species and provincially protected species *Oxalis semiloba*, no Red Data Listed or other provincially protected or any other plant species of conservational significance were found to be present within this portion of the proposed project area. It is however recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted.

The proposed surface footprint area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map). The low height woody component and sparse savannah of the area also does not necessarily provide suitable nesting habitat for the African white-backed vulture (*Gyps africanus*) or congregated nests of sociable weavers (*Philetairus socius*) (provincially protected). Although no nesting sites are evident, the area still provides important foraging grounds for the African white-backed vulture (*Gyps africanus*). The separate Avifaunal Impact Assessment conducted indicated that these areas provide suitable African white-backed vulture habitat. No other unique or important habitats for nesting sites were observed.

Signs of mammals traversing the area, such as the common warthog (*Phacochoerus africanus*), duiker (*Sylvicapra grimmia*) and steenbok (*Raphicerus campestris*) which are all provincially protected are evident. This subsequently means that various meso-predators are also highly likely to be present. These species naturally utilise the area for breeding and/or persistence habitat but, their

mobility and the broad, continuous surrounding savannah landscape allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.

The Present Ecological State (PES) of the southern development portion is classified as Class A as it is mainly unmodified, natural and pristine.

The portion forms part of the Kimberley Thornveld vegetation type (SVk 4) which is classified as least threatened (SANBI, 2006-). The portion however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017). The three most southerly situated pivot lands form part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. Due to their significant distance away from the Riet River, the two northerly situated pivot lands of the southern development portion do not necessarily form an integral part of the ecological corridor associated with the Riet River catchment and riparian zone relative to the three most southerly situated pivot lands, but are still classified as CBA 2. The Ecological Importance and Sensitivity (EIS) of the southern development portion is therefore classified as Class B (high) as it is ecologically important and sensitive on provincial or possibly national scale for the persistence of the CBA 2 ecological corridor and due to the significant presence of nationally protected tree species. The area is considered to be of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, CBA 2 and protected/Red Data Listed species.

8.1.3. Water bodies

Three separate, confined water bodies are present within the proposed Zulani surface footprint area. They are located within the north-western, north-eastern and southern portions of the area respectively. None of these water bodies will be directly or significantly impacted upon by the layout of the proposed new centre pivot lands.

The north-westerly situated water body forms the eastern boundary of a larger ephemeral catchment area which accumulates water from the west. It is surrounded by an area with an increased density of the woody component. Although single stemmed trees such as *Vachellia erioloba* (nationally protected) and *Vachellia haematoxylon* (nationally protected) are still present in

high numbers, their dominance is reduced and replaced by an increase in density of multi-stemmed shrubs and trees such as *Senegalia mellifera*, *Vachellia tortilis*, *Ziziphus mucronata* and *Grewia flava*. The forb species *Lotononis listii* was also encountered in this area. The nearest proposed new centre pivot land to this water body is situated approximately 550 m to the east and the proposed development should therefore not have any significant effect on the flow (coming from the west) or integrity of this water body.



Figure 8: Image illustrating the presence of the north-westerly situated water body



Figure 9: Image illustrating the increased woody density of the area surrounding the north-westerly situated water body

The north-easterly situated water body constitutes a completely isolated and confined depression area which will only accumulate and hold water during significant rainfall events. Several large *Vachellia erioloba* (nationally protected) individuals are present within the depression which confirms its lack of significant and uninterrupted water retention. The nearest proposed new centre pivot land to this water body is situated approximately 100 m to the south (which is topographically lower) and the proposed development should therefore not have any significant effect on the flow or integrity of this water body. It should however be included in the Water Use License Application (WULA) submission if required by the Department of Water and Sanitation in accordance with the National Water Act (Act 36 of 1998).



Figure 10: Image illustrating the presence of the north-easterly situated water body

The southerly situated water body constitutes an artificial dam which accumulates water from the topographically higher ridge/hill area to the east. The nearest proposed new centre pivot land to this water body is situated approximately 100 m to the west (which is topographically lower) and the proposed development should therefore not have any significant effect on the flow or integrity of this water body. It should however be included in the Water Use License Application (WULA) submission if required by the Department of Water and Sanitation in accordance with the National Water Act (Act 36 of 1998).

8.1.4. Pump station and Irrigation pipeline

A new water extraction point with pumping system will be constructed within the Riet River to extract water for irrigation purposes. The following information was received from the EAP regarding irrigation processes:

Extraction Pump:

- The extraction pumps will be 2 x 75 kW pumps and will be constructed outside the 1:100 year flood line and riparian zone of the Riet River. The pumping station will cover an area of approximately 10 m². From here, the extraction pipe will be installed on a float (1 x 2 m) which will be able to rise and drop along with the water level. This will not significantly impact on any important riparian vegetation species as this area is mostly disturbed already.
- The power for the extraction pump will be obtained from a new Eskom power point.
- The extraction pump will run for approximately 12 hours per day, pumping water to the amount of 300 m³ per hour (Monday to Friday). The plant to harvest period is approximately 20 weeks. This equates to a total annual water consumption of approximately 360 000 m³.

Pipelines:

- A 315 mm pipeline of approximately 1.4 km in length will be constructed to transport water from the extraction point in the Riet River to the booster pumps (75 kW) and from there with 250 mm and 315 mm pipelines directly into the pivots. A narrow linear section of approximately 900 mm will be cleared along the pipeline route in order to accommodate the piping infrastructure. This will not pose a significant impact due to the confined linear surface area. However, some tree species such as the *Vachellia erioloba* (nationally protected) and *Vachellia haematoxylon* (nationally protected) might also need to be removed in order to make way for the proposed pipeline. Once the exact linear route of the pipeline is finalised, an Ecological Walkthrough will have to be conducted to find the best possible route that would cause minimal harm. The pipeline will be buried subsurface to prevent any potential damage or obstruction. A trench of approximately 900 mm wide will be excavated in order to accommodate the subsurface burial of the pipeline.

Table 5: Species list for the proposed Zulani surface footprint area (Provincially protected species highlighted in yellow, nationally protected species in orange and Red Data Listed species in red)

Species name			
Graminoids	Forbs	Shrubs & trees	Fauna
<i>Aristida congesta</i>	<i>Acrotome inflata</i>	<i>Acacia erioloba</i>	<i>Gyps africanus</i>
<i>Aristida diffusa</i>	<i>Chrysocoma obtusata</i>	<i>Acacia haematoxylon</i>	<i>Phacochoerus africanus</i>
<i>Enneapogon cenchroides</i>	<i>Crotalaria orientalis</i>	<i>Acacia mellifera</i>	<i>Philetairus socius</i>
<i>Eragrostis lehmanniana</i>	<i>Drimia spp.</i>	<i>Acacia tortilis</i>	<i>Raphicerus campestris</i>
<i>Eragrostis obtusa</i>	<i>Eriocephalus aspalathoides</i>	<i>Asparagus spp.</i>	<i>Sylvicapra grimmia</i>
<i>Heteropogon contortus</i>	<i>Felicia spp.</i>	<i>Boscia albitrunca</i>	-
<i>Pogonarthria squarrosa</i>	<i>Helichrysum obtusum</i>	<i>Ehretia rigida</i>	-
<i>Schmidtia pappophoroides</i>	<i>Lotononis listii</i>	<i>Grewia flava</i>	-
<i>Stipagrostis obtusa</i>	<i>Oxalis semiloba</i>	<i>Rhigozum trichotomum</i>	-
-	-	<i>Tarchonanthus camphoratus</i>	-
-	-	<i>Ziziphus mucronata</i>	-

8.2. Alternative 2

Alternative 2 of the proposed Zulani surface footprint area constitutes the same area as Alternative 1 except for the exclusion of the 3 most southerly situated centre pivot lands associated with the southern development portion. The centre pivot lands being excluded in Alternative 2, constitute part of the open bottomland grassland/sparse savannah (as discussed under heading 8.1.2.). As discussed under heading 8.1.2., these excluded centre pivot lands form part of the larger continuous CBA 2 ecological corridor associated with the Riet River catchment and riparian zone.

Although these three centre pivot lands will be excluded in Alternative 2, the two remaining most southerly located pivot lands of Alternative 2, which are subsequently also associated with the CBA 2, will still be developed (as discussed under heading 8.1.2.). Due to their significant distance away from the Riet River, these two pivot lands are however not necessarily regarded as forming an integral part of the ecological corridor associated with the Riet River catchment and riparian zone relative to the three most southerly situated pivot lands. The Ecological Importance and Sensitivity (EIS) of this southern development portion is therefore classified as Class B (high) as it is ecologically important and sensitive on provincial or possibly national scale for the persistence of the CBA 2 ecological corridor and due to the significant presence of nationally protected tree species. The area is of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, CBA 2 and protected/Red Data Listed species.

8.3. Ecological Sensitivity Map

The sensitivity map below illustrates the two proposed Alternatives as well as the locations of the various identified portions as discussed under heading 8.1.

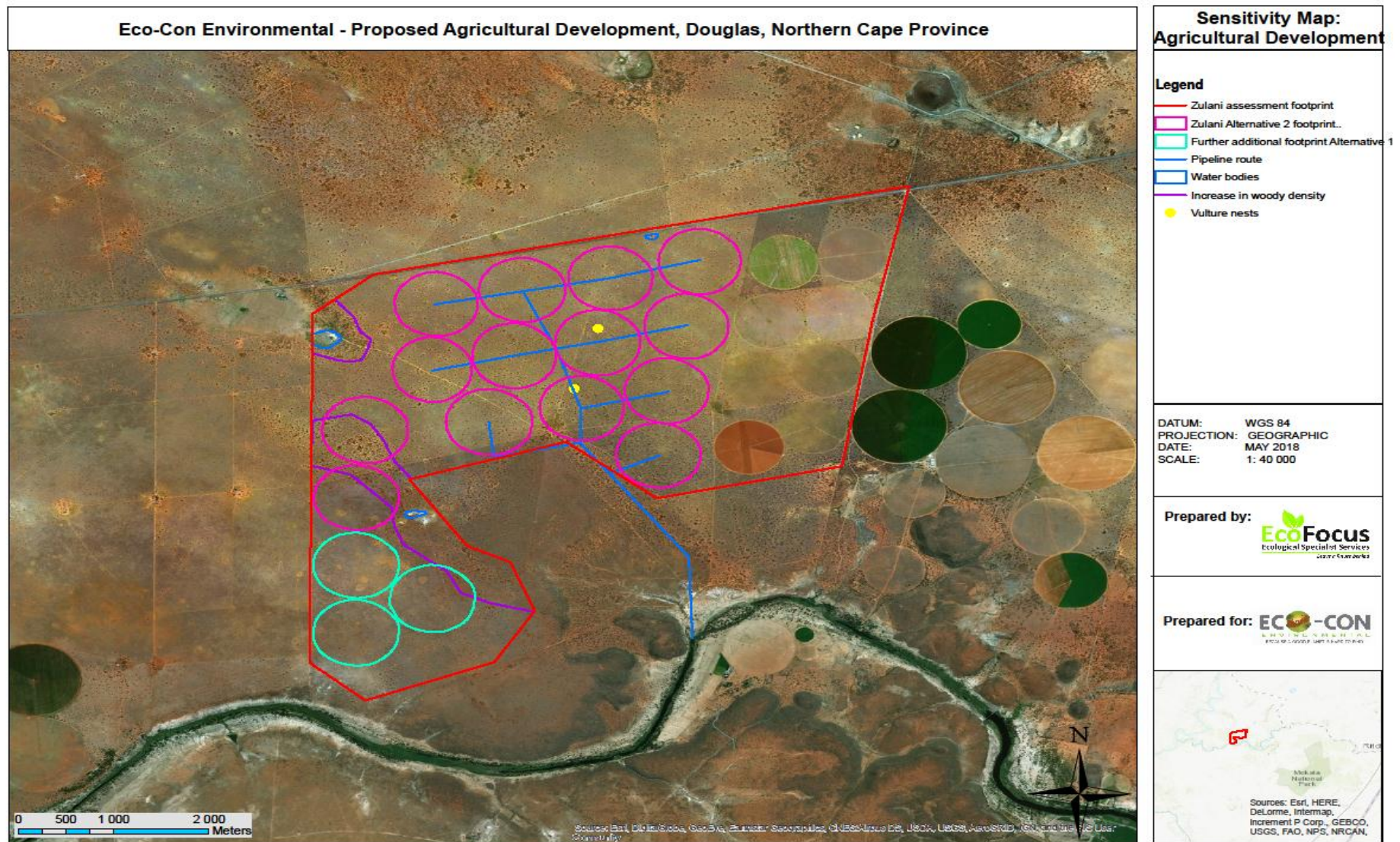


Figure 11: Sensitivity map of the proposed Zulani surface footprint area illustrating the various identified portions (see A3 sized map in the Appendices)

9. Ecological Impact Assessment

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

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

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

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

9.1. Construction Phase

Transformation of terrestrial vegetation on the proposed project footprint areas associated with the Kimberley Thornveld vegetation type (SVk 4)

The proposed development will in all probability completely transform the existing surface vegetation on the proposed project footprint area. The Kimberley Thornveld vegetation type (SVk 4) is however classified as least threatened (SANBI, 2006-) and the vegetation type is vast and homogenous and largely undeveloped. The proposed footprint area is however relatively large in size and the majority of the veld and vegetation is in a natural, relatively pristine condition and therefore scored high PES and EIS values. The area is therefore viewed as being of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type. The significance of this potential impact on vegetation will therefore be medium-high.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Transformation of a Critical Biodiversity Area two (CBA 2) associated with the proposed project area

The proposed development will in all probability completely transform the existing surface vegetation on the proposed project footprint area. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017). The proposed southern development portion, which is associated with Alternative 1 (preferred) and the two most southerly situated pivot lands of Alternative 2, falls within a Critical Biodiversity Area two (CBA 2). The area forms part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. The proposed footprint area therefore scored a very high EIS value.

The northern development portion associated with Alternative 1 (preferred) and Alternative 2 does not fall within a CBA 2 and rather forms part of 'other natural areas' in accordance with the NCSBP. The significance of this potential impact on the CBA 2 will therefore be high for Alternative 1 (preferred) but medium-high for Alternative 2.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Destruction/damage to Red Data Listed, nationally or provincially protected species individuals/habitats

The proposed development will in all probability completely transform the existing surface vegetation on the proposed project footprint area. The two dominant tree species present are *Vachellia erioloba* (nationally protected) and *Vachellia haematoxylon* (nationally protected) which are fairly equally represented in the area. The average density of trees within the footprint area amounts to approximately between 15 trees/ha and 20 trees/ha which equates to a total estimate of approximately 14 400 trees within the footprint area which will need to be removed. Approximately ten individuals of the nationally protected tree species *Boscia albitrunca* were also found to be present within the rocky areas associated with the southern development footprint (Alternatives 1 & 2). Individuals of the provincially protected species *Oxalis semiloba* were also encountered.

Two active nests of the African white-backed vulture (*Gyps africanus*), which is a critically endangered Red Data Listed species, were encountered atop large *Vachellia* trees. The separate Avifaunal Impact Assessment conducted for the proposed project, indicated the presence of six active nests. It is however highly likely that there are more active nests present in the area as the larger area provides important foraging grounds. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area.

Signs of mammals traversing the area, such as the common warthog (*Phacochoerus africanus*), duiker (*Sylvicapra grimmia*) and steenbok (*Raphicerus campestris*) which are all provincially protected are evident. This subsequently means that various meso-predators are also highly likely to be present. These species naturally utilise the area for breeding and/or persistence habitat. The significance of this potential impact will therefore be high.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Alien invasive species establishment

The proposed project footprint and surrounding natural area could potentially be prone to alien invasive species establishment due to disturbances caused by construction activities. Due to the relatively large size and the natural, relatively pristine condition of the veld and vegetation, the significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Surface material erosion

Areas within and around the proposed project footprint could potentially be prone to surface soil erosion due to the loosening of materials and removal of vegetation during construction which usually binds surface material. Due to the flat to gently sloping topography of the northern development portion, the risk of erosion is small. However, due to the gently to moderately sloping topography of the southern development portion, the risk of erosion is slightly higher in those areas. The significance of this potential impact will be medium for Alternative 1 (preferred) but low for Alternative 2.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Dust generation and emissions

The activities associated with the proposed project construction phase could potentially result in significant fugitive dust emissions due to the relatively large size and specific nature of the cultivation processes. This could spread into the surrounding areas and the significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Impeding and contamination of the surface water catchment and drainage area towards the Riet River

The proposed development could potentially result in impediment and contamination of surface water flow towards the Riet River situated to the south due to the transformation of the existing surface structure. The Riet River is located approximately 600 m away from Alternative 1 (preferred) and 2.4 km away from Alternative 2 but there are no significant drainage lines within the immediate vicinity of the site which could form part of the river's catchment. The relatively flat topography of the northern development portion suggests that the proposed project area does not necessarily have a significant influence on the river catchment.

The 3 additional centre pivot lands of the southern development portion, which are associated with Alternative 1, are however located in close proximity to the Riet River. The gently to moderately sloping topography suggests that the proposed project area could have a significant influence on the river catchment. The significance of this potential impact will therefore be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.2. Operational Phase

Once the construction phase has been completed, there should be no significant additional ecological impacts associated with the operational phase of the project other than the significant long term impacts already discussed for the construction phase. The only potentially significant ecological impacts associated with the operational phase are the following:

Alien invasive species establishment

The proposed project footprint and surrounding natural area could potentially be prone to alien invasive species establishment due to disturbances caused by continued operational activities. Due to the relatively large size and the natural, relatively pristine condition of the veld and vegetation, the significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Surface material erosion

Areas within and around the proposed project footprint could potentially be prone to surface soil erosion due to continued operational activities. Due to the flat to gently sloping topography of the northern development portion, the risk of erosion is small. However, due to the gently to moderately sloping topography of the southern development portion, the risk of erosion is slightly higher in those areas. The significance of this potential impact will be medium for Alternative 1 (preferred) but low for Alternative 2.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Dust generation and emissions

The activities associated with the proposed project operational phase could potentially result in significant fugitive dust emissions due to the relatively large size and specific nature of the cultivation processes. This could spread into the surrounding areas and the significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Impeding and contamination of the surface water catchment and drainage area towards the Riet River

The proposed development could potentially result in continued impediment and contamination of surface water flow towards the Riet River during the operational phase. The relatively flat topography of the northern development portion and significant distance away from the river suggests that the proposed project area does not necessarily have a significant influence on the river catchment.

The 3 additional centre pivot lands of the southern development portion, which are associated with Alternative 1, are however located in close proximity to the Riet River. The gently to moderately sloping topography suggests that the proposed project area could have a significant influence on the river catchment.

The continued utilisation of significant amounts of chemical fertilisers, pesticides and/or herbicides could, over time, negatively impact on the water quality and subsequent ecology of the catchment area. The significance of this potential impact on the surface water catchment and drainage area will therefore be medium-high for Alternative 1 (preferred) and medium for Alternative 2.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Impeding of the ecological connectivity and functionality of the broader remaining natural corridor

Once the construction phase has been completed and the centre pivot lands are in place, it will impede and fragment the ecological connectivity of the broader natural corridor along the Riet River. Although significant existing agricultural developments are scattered along the river, there is still a degree of natural connectivity and remaining corridor which is utilised for adequate movement and dispersal of fauna and flora through the developed area. Smaller mammals and meso-predators would still be able to move through the developed area in order to reach adjacent natural areas but the integrity of ecological processes will be negatively influenced. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Over extraction of the Riet River

Significant quantities of river water will be extracted for irrigation purposes. In accordance with the information received from the EAP, the proposed development will require approximately 360 000 m³ per annum in order to irrigate adequately. The water will be sourced from the Riet River. This could potentially lead to over extraction in the river if not adequately managed. This area falls under the Oranje-Riet irrigation scheme where water is transferred from the Orange River to this portion of the Riet River for agricultural purposes. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.3. Cumulative Impacts

Due to the significant amount of localised existing agricultural developments and transformation in the area, Alternatives 1 & 2 of the proposed development will present a significant localised increase in cumulative negative impacts on the transformation of the CBA 2 and impeding of the ecological connectivity and functionality associated with the larger continuous ecological corridor as well as on the impediment and contamination of the Riet River catchment and riparian zone.

It will also present a significant localised increase in cumulative negative impacts on the destruction of nationally protected tree species and nesting sites and foraging grounds of the critically endangered African white-backed vulture (*Gyps africanus*). Nesting sites and foraging grounds are being nationally transformed and reduced at an alarming rate specifically by agricultural developments within the greater Kimberley area which is impacting negatively on the subsistence of this critically endangered species.

By application of the NEMA Mitigation Hierarchy, the significance of residual cumulative impacts cannot be adequately mitigated to within acceptable levels other than investigating the potential implementation of an ecological offset as mitigation. The only potentially suitable mitigation option would be for the applicant to make available a suitable ecological offset area which can be formally protected in order to compensate for the significant destruction of the CBA 2, nationally protected tree species and nesting sites and foraging grounds of the critically endangered species.

It is recommended that Alternative 2 rather be considered due to the smaller impact footprint. If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project

area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.

9.4. Risk Ratings of Potential Impacts

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

9.4.1. Construction Phase

Table 6: Environmental Risk and Significance Ratings

	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Transformation of terrestrial vegetation on the proposed project footprint areas associated with the Kimberley Thornveld vegetation type (SVk 4)		
Magnitude of Negative or Positive Impact	High (8)	Medium (6)	-
Duration of Negative or Positive Impact	Long term (4)	Long term (4)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)	-
Reversibility of Impact	Moderate (3)	Moderate (3)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Medium	-

Environmental Significance Score and Rating prior to mitigation	Medium-High (80)	Medium (72)	-
Mitigation Measures to be implemented	<p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>Natural veld situated in-between the proposed centre pivot lands must not be impacted upon and must be left in situ.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the proposed centre pivot lands.</p> <p>It is recommended that Alternative 2 rather be considered due to the smaller impact footprint.</p> <p>If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.</p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-

Environmental Significance Score and Rating after mitigation implementation	Medium (72)	Medium (72)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Transformation of a Critical Biodiversity Area two (CBA 2) associated with the proposed project area		
Magnitude of Negative or Positive Impact	Very High (10)	Medium (6)	-
Duration of Negative or Positive Impact	Long term (4)	Long term (4)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	High (4)	High (4)	-
Reversibility of Impact	Moderate (3)	Moderate (3)	-
Probability of Impact Occurrence	Definite (5)	High (4)	-

Cumulative Impact Rating prior to mitigation	Medium-High	Medium-High	-
Environmental Significance Score and Rating prior to mitigation	High (120)	Medium-High (80)	-
Mitigation Measures to be implemented	<p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>Natural veld situated in-between the proposed centre pivot lands must not be impacted upon and must be left in situ.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the proposed centre pivot lands.</p> <p>It is recommended that Alternative 2 rather be considered due to it falling outside the CBA 2.</p> <p>If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.</p>		

Cumulative Impact Rating after mitigation implementation	Medium-High	Medium-High	-
Environmental Significance Score and Rating after mitigation implementation	Medium-High (80)	Medium-High (80)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Destruction/damage to Red Data Listed, nationally or provincially protected species individuals/habitats		
Magnitude of Negative or Positive Impact	Very High (10)	High (8)	-
Duration of Negative or Positive Impact	Long term (4)	Long term (4)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	High (4)	High (4)	-
Reversibility of Impact	Low (4)	Low (4)	-

Probability of Impact Occurrence	Definite (5)	Definite (5)	-
Cumulative Impact Rating prior to mitigation	Medium-High	Medium-High	-
Environmental Significance Score and Rating prior to mitigation	High (125)	High (120)	-
Mitigation Measures to be implemented	<p>By application of the NEMA Mitigation Hierarchy, the significance of this residual impact cannot be adequately mitigated to within acceptable levels other than investigating the potential implementation of an ecological offset as mitigation.</p> <p>It is recommended that Alternative 2 rather be considered due to the smaller impact footprint.</p> <p>If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.</p> <p>Ensure that the relevant trees housing nesting sites, do not get removed during the breeding season but rather outside the breeding and fledging period. This should afford the identified birds the opportunity to successfully relocate without influencing and jeopardising their breeding routines and success. The opinion and recommendations of the Avifaunal Specialist must however be sought in this regard.</p>		

	<p>The mobility of identified mammals and the broad, continuous surrounding savannah landscape allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.</p> <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. This will ensure that no provincially protected or significant species have potentially been omitted.</p> <p>A Provincial Flora Permit and National Protected Tree Permit has to be obtained prior to the commencement of any construction activities.</p>		
Cumulative Impact Rating after mitigation implementation	Medium-High	Medium-High	-
Environmental Significance Score and Rating after mitigation implementation	Medium-High (92)	Medium-High (92)	-

	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Alien invasive species establishment		
Magnitude of Negative or Positive Impact	Medium (6)	Medium (6)	-
Duration of Negative or Positive Impact	Short term (2)	Short term (2)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Low	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (56)	Medium (56)	-

Mitigation Measures to be implemented	<p>Implement suitable alien invasive species establishment prevention measures during the construction phase.</p> <p>Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment.</p> <p>Natural veld situated in-between the proposed centre pivot lands must not be impacted upon and must be left in situ.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the proposed centre pivot lands.</p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (28)	Low (28)	-

	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Surface material erosion		
Magnitude of Negative or Positive Impact	Medium (6)	Low (4)	-
Duration of Negative or Positive Impact	Short term (2)	Short term (2)	-
Extent of Positive or Negative Impact	Site specific (1)	Site specific (1)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (52)	Low (44)	-

Mitigation Measures to be implemented	<p>Implement suitable erosion prevention measures during the construction phase.</p> <p>Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant erosion.</p> <p>Adequate storm water management measures must be implemented on the site in order to sufficiently manage storm water runoff and clean/dirty separation during the construction phase to prevent significant erosion.</p> <p>It is recommended that Alternative 2 rather be considered due to its flat to gently sloping topography.</p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (33)	Low (33)	-

	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Dust generation and emissions		
Magnitude of Negative or Positive Impact	Medium (6)	Medium (6)	-
Duration of Negative or Positive Impact	Short term (2)	Short term (2)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Low	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (56)	Medium (56)	-

Mitigation Measures to be implemented	<p>Implement suitable dust management and prevention measures during the construction phase.</p> <p>Areas within and immediately surrounding the proposed project footprints must be adequately rehabilitated to prevent significant dust emissions.</p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (42)	Low (42)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Impeding and contamination of the surface water catchment and drainage area towards the Riet River		
Magnitude of Negative or Positive Impact	Medium (6)	Low (4)	-
Duration of Negative or Positive Impact	Short term (2)	Short term (2)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-

Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (64)	Medium (56)	-
Mitigation Measures to be implemented	<p>Adequate storm water management measures must be implemented on the site in order to sufficiently manage storm water runoff and clean/dirty separation during the construction phase and allow natural flow to continue as far as practicably possible.</p> <p>It is recommended that Alternative 2 rather be considered due to its distance away from the Riet River and its subsequent smaller influence on the river catchment.</p>		

Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (48)	Low (42)	-

9.4.2. Operational Phase

Table 7: Environmental Risk and Significance Ratings

	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Alien invasive species establishment		
Magnitude of Negative or Positive Impact	Medium (6)	Medium (6)	-
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Low	Low	-

Environmental Significance Score and Rating prior to mitigation	Medium (60)	Medium (60)	-
Mitigation Measures to be implemented	Implement suitable alien invasive species establishment prevention measures during the operational phase.		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (30)	Low (30)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Surface material erosion		
Magnitude of Negative or Positive Impact	Medium (6)	Low (4)	-
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-

Extent of Positive or Negative Impact	Site specific (1)	Site specific (1)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (56)	Low (48)	-
Mitigation Measures to be implemented	<p>Implement suitable erosion prevention measures during the operational phase.</p> <p>Adequate storm water management measures must be implemented on the site in order to sufficiently manage storm water runoff and clean/dirty separation during the operational phase to prevent significant erosion.</p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-

Environmental Significance Score and Rating after mitigation implementation	Low (36)	Low (36)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Dust generation and emissions		
Magnitude of Negative or Positive Impact	Medium (6)	Medium (6)	-
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-

Cumulative Impact Rating prior to mitigation	Low	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (60)	Medium (60)	-
Mitigation Measures to be implemented	Implement suitable dust management and prevention measures during the operational phase.		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (39)	Low (39)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Impeding and contamination of the surface water catchment and drainage area towards the Riet River		
Magnitude of Negative or Positive Impact	High (8)	Medium (6)	-

Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium-High (76)	Medium (68)	-
Mitigation Measures to be implemented	<p>Irrigation, fertilisation and herbicide/pesticide practices must be adequately managed in order to prevent over-fertilisation or over irrigation which could lead to significant leaching and contamination of groundwater and the river system. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.</p> <p>Adequate storm water management measures must be implemented on the site in order to sufficiently manage storm water runoff and clean/dirty separation during the operational phase and allow natural flow to continue as far as practicably possible.</p>		

	It is recommended that Alternative 2 rather be considered due to its distance away from the Riet River and its subsequent smaller influence on the river catchment.		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Medium (51)	Medium (51)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Impeding of the ecological connectivity and functionality of the broader remaining natural corridor		
Magnitude of Negative or Positive Impact	Medium (6)	Low (4)	-
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-

Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)	-
Reversibility of Impact	High (2)	High (2)	-
Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (68)	Medium (60)	-
Mitigation Measures to be implemented	<p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>Natural veld situated in-between the proposed centre pivot lands must not be impacted upon and must be left in situ.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the proposed centre pivot lands.</p> <p>It is recommended that Alternative 2 rather be considered due to the smaller impact footprint.</p>		

Cumulative Impact Rating after mitigation implementation	Medium	Medium	-
Environmental Significance Score and Rating after mitigation implementation	Medium (60)	Medium (60)	-
	Alternative 1 (preferred)	Alternative 2	No-go alternative
Identified Environmental Impact	Over extraction of the Riet River		
Magnitude of Negative or Positive Impact	Medium (6)	Medium (6)	-
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)	-
Extent of Positive or Negative Impact	Regional (3)	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)	-
Reversibility of Impact	High (2)	High (2)	-

Probability of Impact Occurrence	High (4)	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (68)	Medium (68)	-
Mitigation Measures to be implemented	<p>Irrigation practices must be adequately managed in order to prevent over-irrigation. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.</p> <p>A Water Use License Application must be submitted to the Department of Water and Sanitation (DWS) prior to commencement of any operational activities.</p> <p>Only the allotted water quantities as per the approved Water Use License are to be extracted.</p> <p>A flow meter is to be installed in order to be able to monitor and manage water consumption.</p> <p>Water consumption figures must be submitted to DWS on a regular basis in order to ensure compliance with the allotted water quantities as per the approved Water Use License.</p>		

Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (45)	Low (45)	-

10. Conclusion

The proposed development will in all probability completely transform the existing surface vegetation on the proposed Zulani surface footprint area. The area forms part of a broad, continuous surrounding savannah landscape mainly associated with the Kimberley Thornveld vegetation type (SVk 4) of which the veld and vegetation is in an undisturbed, natural and relatively pristine condition. The area therefore scored a high PES value.

The dominant tree species present within the footprint area is *Vachellia erioloba* (nationally protected) while the species *Vachellia haematoxylon* (nationally protected) is also well represented. The average density of trees within the footprint area amounts to approximately between 15 trees/ha and 20 trees/ha which equates to a total estimate of approximately 14 400 trees within the footprint area which will need to be removed.

Two active nests of the African white-backed vulture (*Gyps africanus*), which is a critically endangered Red Data Listed species, were encountered atop large *Vachellia* trees. The separate Avifaunal Impact Assessment conducted for the proposed project, indicted the presence of six active nests. It is however highly likely that there are more active nests present in the area as the larger area provides important foraging grounds. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area.

The northern development portion of the proposed Zulani surface footprint area is classified as 'other natural area' in accordance with the NCSBP. The southern development portion however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable for reaching certain minimum required provincial biodiversity targets for ecosystem types, species or ecological processes (Collins, 2017). Such an area must be maintained in a natural or near-natural state in order to meet biodiversity targets (Collins, 2017). The area forms part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. The Ecological Importance and Sensitivity (EIS) of the proposed project area is therefore classified as Class B (high) as it is ecologically important and sensitive on provincial and national scale for the persistence of the CBA 2 ecological corridor and due to the significant presence of nationally protected tree species and the presence of the critically endangered African white-backed vulture. The area is considered to be of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, CBA 2 and protected/Red Data Listed species.

It is the opinion of the specialist that, by application of the NEMA Mitigation Hierarchy, the significance of residual impacts associated with transformation of the CBA 2 and destruction of nationally protected tree species and critically endangered bird species habitat cannot be suitably reduced and mitigated to within acceptable levels for Alternative 1. This must therefore be seen as a fatal flaw for the proposed Alternative 1 and it is therefore not recommended that Alternative 1 be considered.

Although Alternative 2 will result in the most southerly situated three pivot lands of the southern development portion of the proposed project associated with the CBA 2 being left in situ and therefore not being significantly impacted upon, the significant presence of nationally protected tree species and the presence of the critically endangered African white-backed vulture habitat within Alternative 2 will still pose a significant residual impact. The two most southerly situated pivot lands of Alternative 2 are also associated with the CBA 2 but due to their significant distance away from the Riet River, these two pivot lands are not necessarily regarded as forming an integral part of the ecological corridor associated with the Riet River catchment and riparian zone relative to the three most southerly situated pivot lands.

By application of the NEMA Mitigation Hierarchy, the significance of residual impacts cannot be adequately mitigated to within acceptable levels other than investigating the potential implementation of an ecological offset as mitigation. The only potentially suitable mitigation option would be for the applicant to make available a suitable ecological offset area which can be formally protected in order to compensate for the significant destruction of the CBA 2, nationally protected tree species and nesting sites and foraging grounds of the critically endangered species.

It is recommended that Alternative 2 be considered due to the smaller impact footprint. If Alternative 2 is considered, the applicant must make available a suitable ecological offset area which can be formally protected in order to compensate for the transformation of the proposed project area. A comprehensive Offset Feasibility Assessment and Report will have to be conducted and compiled in order to identify and inform on an area of suitable size and ecological value which could meaningfully contribute to the regional and provincial biodiversity management requirements and strategies. The proposed Offset Feasibility Assessment and Report will have to be evaluated by the relevant departments in order to inform on their approval/rejection process.

11. References

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www.climate-data.org

12. Details of the Specialist

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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

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.

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 Nootgedacht 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.