

Draft Biodiversity Offset Feasibility Report

**The Farms Zulani no 167, Banks Drift no
164 & Lorraine no 100 Agricultural
Developments, Douglas, Northern Cape
Province**

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Compiled for:



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Executive Summary

The project applicant, Idstone Farming (Pty) Ltd proposes to develop three separate natural areas of virgin soil for agricultural purposes. The proposed developments will entail the clearance of existing vegetation and subsequent cultivation of centre pivot lands for commercial planting and harvesting of potatoes for local and export purposes.

The three separate proposed development areas are respectively situated on the following farms:

- The Remaining Extent of the Farm Zulani no 167 (SG 21 Digit Code: C03700000000016700000)
- The Remaining Extent of the Farm Banks Drift no 164 (SG 21 Digit Code: C03700000000016400000) & Portion 1 of the Farm Christians Drift no 166 (SG 21 Digit Code: C03700000000016600001) (together)
- Portion 1 of the Farm Lorraine no 100 (SG 21 Digit Code: C03700000000010000001)

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

All three proposed developments have alternative layouts where the number of centre pivots to be cultivated is reduced for the Alternative 2 options. The proposed sizes of the relevant new centre pivot lands of the three Alternative 1 options (which constitute the largest areas) as per the Environmental Impact Assessment Reports are as follows (in the order of the farms as above):

- 17 centre pivot lands of approximately 45 ha in size each which equates to a total area size of approximately 765 ha
- 16 centre pivot lands and 2 centre pivot lands of approximately 25 ha in size each which equates to a total area size of approximately 450 ha
- 16 centre pivot lands of approximately 50 ha in size each which equates to a total area size of approximately 800 ha

Due to the nature of the potential impacts of the proposed projects on the local ecology, ecological assessments were required. EcoFocus Consulting (Pty) Ltd was therefore appointed by the EAP as the independent ecological specialist to conduct the required ecological assessments for the proposed projects.

The findings and conclusions of the ecological assessments indicated that the proposed three separate developments would all potentially pose significant long term residual ecological impacts which, by application of the NEMA Mitigation Hierarchy, could not be suitably reduced and mitigated to within acceptable levels namely:

- **Transformation of a pristine Critical Biodiversity Area two (CBA 2)** mainly associated with the Kimberley Thornveld vegetation type (SVk 4) and forming part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. Portion 1 of the Farm Lorraine no 100 additionally falls within the buffer zone surrounding the Mokala National Park to the south. These areas would have to be cleared in order to make way for the proposed cultivated centre pivot lands.
- **Destruction/damage to** a significant number of individuals of the **nationally protected tree species *Vachellia erioloba* (Camel thorn) & *Vachellia haematoxylon* (Grey camel thorn)** which would have to be cleared in order to make way for the proposed cultivated centre pivot lands. Portion 1 of the Farm Lorraine no 100 is virtually devoid of any *Vachellia haematoxylon* (Grey camel thorn) individuals but is overwhelmingly dominated by *Vachellia erioloba* (Camel thorn).
- **Destruction/damage to nesting habitat and foraging grounds of** a significant number of individuals of **the nationally and globally Critically Endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture)** which mainly nest atop larger *Vachellia* trees. Significant numbers of large trees would have to be cleared in order to make way for the proposed cultivated centre pivot lands.

A Draft Biodiversity Offset Feasibility Assessment therefore had to be conducted in order to determine whether these significant long term residual ecological impacts could potentially be mitigated by provision of an offset area. The summary and conclusions of this Draft Biodiversity Offset Feasibility Assessment Report are as follows:

It is recommended that Alternative 2 for the Remaining Extent of the Farm Zulani no 167 and Alternative 2 for the Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166 be considered for the proposed developments. These alternatives mainly fall outside the Critical Biodiversity Area two (CBA 2) areas and have relatively small direct impacts. In the case of these Alternatives 2 the proposed developments are unlikely to lead to direct and permanent destruction of irreplaceable or near-irreplaceable biodiversity as no critically endangered bird individuals will be killed, in which case it would have constituted a fatal flaw. The proposed

developments will however lead to some loss of CBA 2 area, significant loss of protected tree species as well as the permanent destruction of significant nesting habitat (although not necessarily unique) and subsequent displacement of a number of critically endangered birds. These residual negative impacts need to be remedied in order to satisfy the NEMA principles.

It is the opinion of the specialist that the significance of residual negative impacts of both development alternatives on Portion 1 of the Farm Lorraine no 100 cannot be reduced and mitigated to within acceptable levels. The significant negative impacts associated with transformation of the CBA 2 (Mokala National Park 10 km buffer zone), destruction of nationally protected tree species and habitat for the Critically Endangered African white-backed vulture pose a high risk of loss of irreplaceable biodiversity. Biodiversity offsets in this case would not be able to remedy these significant residual impacts which must therefore be seen as a fatal flaw for this particular proposal.

With regard to the residual negative impacts of the Alternative 2 proposals of the two developments:

- A combined total area of approximately 805 ha of a Least Threatened vegetation type in overall undisturbed, natural condition, comprising approximately 90 ha of CBA 2 habitat and 715 ha of Other Natural Areas (ONA's), would be converted by the proposed developments.
- A combined total of approximately 15 875 individuals of the nationally protected tree species *Vachellia erioloba* & *Vachellia haematoxylon* will have to be removed on the approximately 805 ha.
- A combined total of approximately 1250 ha of broader nesting habitat and foraging grounds including a minimum of 8 active nests of the Critically Endangered African white-backed vulture will be significantly impacted upon by physical clearance of vegetation and compromising of their ecological integrity due to the ecological 'edge effect' caused by surrounding cultivated pivot lands and agricultural activities. This area including a minimum of 8 active nests could constitute an approximate 4.5 % of the greater Kimberley area breeding population and approximately 14.5 % of the specific Mokala colony breeding population.

A 'like for like' approach was followed in determining suitable locations for potential biodiversity offset areas by identifying areas with similar biodiversity pattern and ecological process components as that of the areas being impacted upon by the proposed developments. The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status of candidate offset areas was further followed as far as practicably possible, by identifying potential biodiversity

offset areas of greater value or priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments.

The most up to date vulture colony figures and data as per Murn *et. al.*, (2017) were used as a baseline for calculating a potential offset size. In accordance with the calculations, a combined minimum biodiversity offset size of approximately 8987 ha is proposed in order to mitigate the significant long term residual ecological impacts associated with the proposed developments. The potential offset area must however be associated with the Mokala vulture colony and must provide a minimum of approximately 6657 ha of suitable nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) which must consist of a *Vachcellia erioloba* and/or *V haemataxylon* dominated savannah landscape. It must also preferably be located within a CBA and/or in close proximity to existing formally protected areas.

The most feasible option for securing the biodiversity offset areas is for the applicant to enter into a stewardship agreement with the state conservation authority. It is proposed that the potential biodiversity offset areas be formally declared as a Nature Reserve in accordance with Section 23 of NEM:PAA, with a number of benefits for biodiversity conservation.

A potential biodiversity offset area for the two proposed developments of approximately 12 297 ha was assessed on five farm properties owned by the applicant. These offset areas provide a large continuous portion of open savannah landscape of approximately 7 427 ha in size which is in a natural, relatively pristine condition. The open savannah landscape forms part of the Mokala vulture colony and provides suitable nesting habitat and foraging grounds for the Critically Endangered African white-backed vulture. In excess of 60 individuals and 35 active nests of this species were encountered during the ecological assessment. The open savannah landscape also houses approximately 148 540 individuals of the nationally protected tree species *Vachellia erioloba*. The offset area is situated directly adjacent north of the Mokala National Park and therefore forms part of the broader nesting habitat and foraging grounds of the Mokala vulture colony.

The remaining portions of the potential biodiversity offset areas constitute either denser woody shrubland- or open karroid shrub- and grassland areas. Although these areas do not provide suitable nesting habitat for the Critically Endangered African white-backed vulture due to the lack of larger *Vachellia spp.* tree individuals, these areas form part of their foraging grounds, thus contributing to

the conservation of this species. These areas add significant value to the broader ecosystem and ecological process. A 'like for like' potential biodiversity offset area is therefore evident with similar and even improved biodiversity pattern and ecological process components as that of the areas being impacted upon by the proposed developments.

All of the potential biodiversity offset properties fall within a Critical Biodiversity Area two (CBA 2) associated with the buffer zone surrounding the Mokala National Park to the south. The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status for the potential biodiversity offset areas is therefore evident as the potential biodiversity offset areas are of greater value and priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments.

The availability of carrion however also plays a significant limiting role when it comes to the capacity of vulture breeding pairs which a specific area can accommodate. Provision of suitable nesting habitat through an offset which is already occupied by active breeding pairs, would therefore not necessarily completely atone for the loss of existing nesting habitat and foraging grounds. Additional mitigation measures for improving/re-establishing degraded habitat and increasing carrion availability in areas would also be required to increase the desired success of the potential offset over time.

The active bush encroachment alleviation and management measures being implemented by the applicant within historically overgrazed areas should, in the long term, lead to the improvement of nesting habitat. Active re-establishment of *Vachellia erioloba* trees and subsequent nesting habitat restoration in such overgrazed bush encroached areas must however also be implemented as additional mitigation measures to increase the desired success of the potential offset over time.

An increase in nest density could potentially also be encouraged within the offset area by increasing the availability of food sources such as incorporating additional vulture 'restaurants' for monitoring purposes. Carrion provided may however not be contaminated by any agricultural remedies known to be poisonous or detrimental to the health of vultures. It is however recommended that a meeting be held with Vulture Research Group in order to agree on the most effective way of addressing this potential mitigation measure and determine the way forward.

In the opinion of the specialist, the declaration and management of the identified properties as a Nature Reserve in accordance with the NEM:PAA requirements, satisfy the offset requirement for the proposed two developments and remedy their significant residual ecological impacts. The proposed developments should therefore be considered by the competent authority for environmental authorisation and approval.

If the Environmental Authorisations for the proposed two developments are approved, it is recommended that an official offset agreement negotiation meeting between the applicant and state conservation authority be conducted as soon as practicably possible. The objective of this meeting must be to finalise the offset agreement and obtain the applicant's consent and intent to declare a Nature Reserve in terms of the NEM:PAA. A number of recommendations are made for conditions to be included in the Environmental Authorisation; some of these conditions would be suspensive, depending on requirements being met before any listed activities could commence (see heading 8.4).

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Abbreviations

CBA	Critical Biodiversity Area
DAFF	Department of Agriculture Forestry and Fisheries
DMR	Department of Mineral Recourses
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
I&AP	Interested and Affected Parties
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Amendment Act (Act 31 of 2004)
NFA	National Forests Act (Act 84 of 1998)
NGO	None Governmental Organisation
NWA	National Water Act (Act 36 of 1998)
ONA	Other Natural Areas
PES	Present Ecological State
WULA	Water Use License Application
WWF	World Wildlife Fund South Africa

Declaration of Independence

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

- am the Director and Ecological Specialist of EcoFocus Consulting (Pty) Ltd
- act as an independent specialist consultant in the field of botany and ecology
- am assigned as the Ecological Specialist consultant by the EAP, 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 three separate natural areas of virgin soil for agricultural purposes. The proposed developments will entail the clearance of existing vegetation and subsequent cultivation of centre pivot lands for commercial planting and harvesting of potatoes for local and export purposes.

Alternative lower impact development types and land use options, which would potentially reduce the significance of ecological impacts on the proposed development areas, were also considered. Livestock and/or game farming on the farms were considered but deemed to be less viable options by the applicant for the following reasons:

- The grazing capacity of the broader areas are relatively low. The effective financial yield from livestock and/or game farming in the area will therefore be miniscule compared to potato farming. Job creation in terms of livestock and/or game farming management, is also significantly lower than that of potato farming.
- Seed potato production is one of the most valuable agricultural crops that can be grown in the Northern Cape Province. As early as 1948 Dr van der Plank, the world-renowned potato scientist and breeder, identified the area between Modder River and Douglas as one of the ideal seed production areas in South Africa.
- In terms of value per cubic meter of water, job creation, export earnings and sustainability, it is one of the top three most effective crops in the Northern Cape Province, including table grapes and pecan nuts.

Seed potato farming is capital and labour intensive. At present, it costs around R180 000 per ha to produce seed potatoes and this has a huge positive multiplying effect in the local and regional farming, labour and business community. The labour component is mainly made up of labour in the packing shed and labour used for roguing which is the continual monitoring and removal of any off-types or diseased plants in the seed plantings. The skilled and semi-skilled staff component is made up of managers, admin staff, foremen, various machine operators and maintenance personnel.

Job creation is therefore significantly increased by implementing potato farming as opposed to livestock and/or game farming. In terms of most effective land use, job creation and other socio-economic advantages, potato farming is regarded as the most financially viable development type option for the area.

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

Due to the nature of the potential impacts of the proposed projects on the local ecology, ecological assessments were required. This was 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 also had to be recommended in order to attempt to reduce/alleviate the identified potential ecological impacts. EcoFocus Consulting (Pty) Ltd was therefore appointed by the EAP as the independent ecological specialist to conduct the required ecological assessments for the proposed projects.

The findings and conclusions of the ecological assessments indicated that the proposed three separate developments would all potentially pose significant long term residual ecological impacts which, by application of the NEMA Mitigation Hierarchy, could not be suitably reduced and mitigated to within acceptable levels.

A Draft Biodiversity Offset Feasibility Assessment therefore had to be conducted in order to determine whether these significant long term residual ecological impacts could potentially be mitigated by provision of an offset area.

2. Objectives of the Offset Feasibility Study

EcoFocus Consulting (Pty) Ltd was appointed to conduct an Offset Feasibility Study. The objectives of the study are:

- To identify and assess potentially suitable biodiversity offset areas which could meaningfully contribute to provincial and national biodiversity targets and conservation strategies.
- To compare the condition and value of biodiversity pattern and ecological processes of the proposed development areas to that of the potential biodiversity offset areas, to ensure that the offset would provide adequate 'like for like' compensation.
- To provide recommendations on the suitability of the proposed biodiversity offset areas to serve as an adequate mitigation measure (i.e. remedy) for the significant long term residual ecological impacts associated with the proposed developments.
- To provide recommendations on the proposed size and type of biodiversity offset areas to be established in accordance with NEM:PAA.
- To provide draft conditions/recommendations with regards to the biodiversity offset to be included in the Environmental Authorisation and subsequent offset agreement if approved by the competent authority.

3. Proposed Development Areas

The three separate proposed development areas are respectively situated on the following farms:

- The Remaining Extent of the Farm Zulani no 167 (SG 21 Digit Code: C03700000000016700000)
- The Remaining Extent of the Farm Banks Drift no 164 (SG 21 Digit Code: C03700000000016400000) & Portion 1 of the Farm Christians Drift no 166 (SG 21 Digit Code: C03700000000016600001) (together)
- Portion 1 of the Farm Lorraine no 100 (SG 21 Digit Code: C03700000000010000001)

The Remaining Extent of the Farm Zulani no 167, Remaining Extent of the Farm Banks Drift no 164 and Portion 1 of the Farm Christians Drift no 166 are situated approximately 42 km outside the town of Douglas directly adjacent south of the R 357 provincial road towards the city of Kimberley. The areas form 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.

Portion 1 of the Farm Lorraine no 100 is situated approximately 42 km outside the town of Douglas road towards the city of Kimberley. It is located approximately 7 km east of the town of Plooyburg and 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.

All three proposed developments have alternative layouts where the number of centre pivots to be cultivated is reduced for the Alternative 2 options. The proposed sizes of the relevant new centre pivot lands of the three Alternative 1 options (which constitute the largest areas) as per the Environmental Impact Assessment Reports are as follows:

- 17 centre pivot lands of approximately 45 ha in size each on the **Remaining Extent of the Farm Zulani no 167** which equates to a total area size of approximately **765 ha**
- 16 centre pivot lands and 2 centre pivot lands of approximately 25 ha in size each on the **Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166** respectively which equates to a total area size of approximately **450 ha**
- 16 centre pivot lands of approximately 50 ha in size each on **Portion 1 of the Farm Lorraine no 100** which equates to a total area size of approximately **800 ha**

See locality map below indicating the potential alternative layouts for the three separate proposed development areas. The Alternative 2 options are indicated in blue and the additional centre pivot lands associated with the Alternative 1 options (which include the blue lands of Alternative 2) are indicated in red.

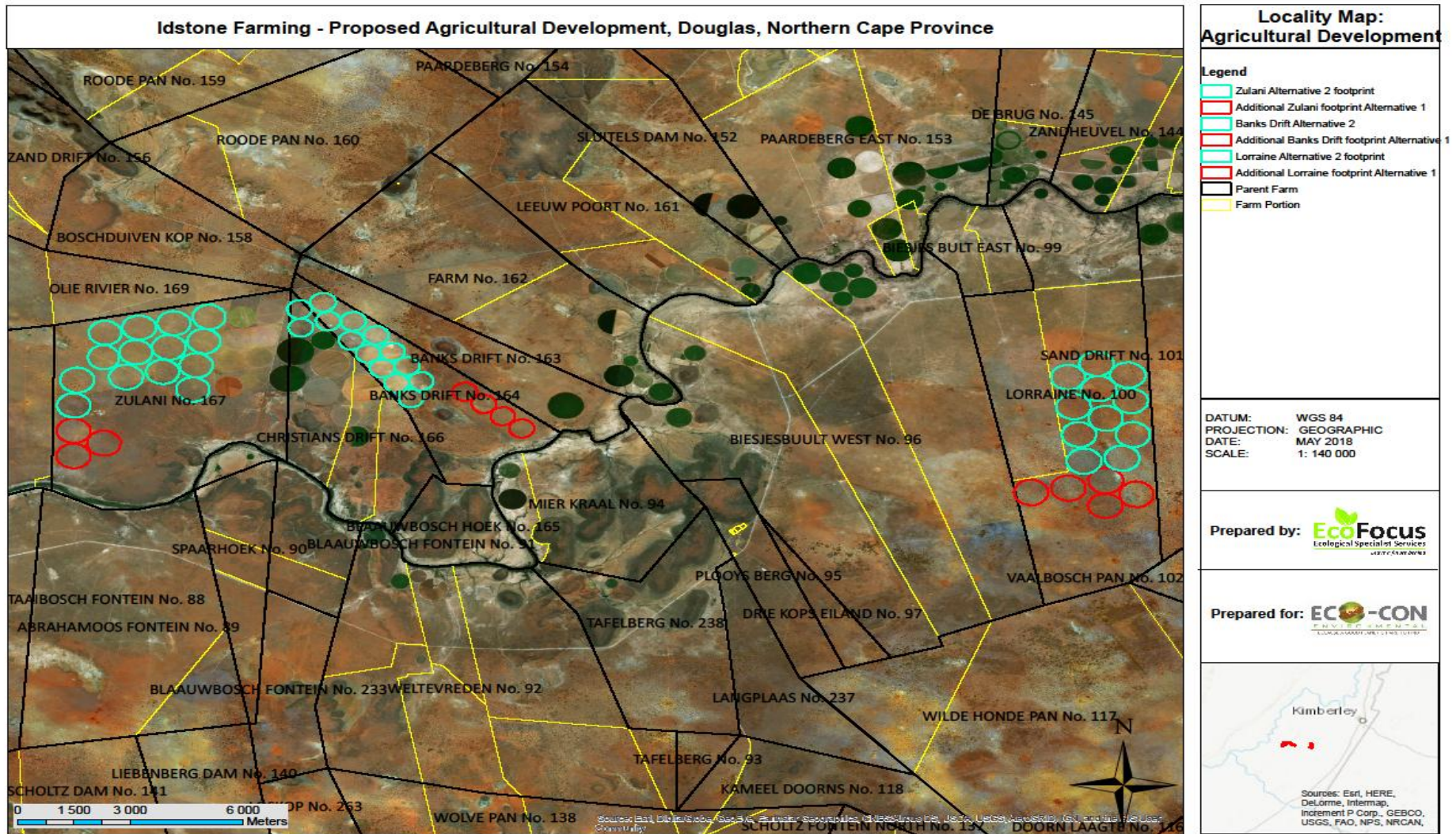


Figure 1: Locality map illustrating the proposed three separate development footprint areas along with their potential alternative layouts (see A3 sized map in the Appendices)

3.1. Vegetation Types

According to SANBI (2006-), the proposed development footprint areas on the Farm Zulani, the Farms Banks Drift & Christians Drift as well as the majority of the Farm Lorraine fall 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. Only the most southern portion of the Farm Banks Drift slightly intrudes into the Upper Gariep Alluvial vegetation type (AZa 4) which is considered to be vulnerable (SANBI, 2006-

Only the north-western corner of the proposed development footprint area on the Farm Lorraine falls within the Vaalbos Rocky Shrubland vegetation type (SVk 5) which is mostly characterised by slopes and elevated hills and ridges within the plains of the Kimberley Thornveld vegetation type (SVk 4) (SANBI, 2006-). Evergreen shrub communities dominate these hills. 'Ground truthing' conducted during the ecological assessment however suggests that the entire proposed development footprint area on the Farm Lorraine rather falls within the Kimberley Thornveld vegetation type (SVk 4) as no distinct change in vegetation composition or soil structure is evident towards the north of the site which is still dominated by open savannah landscape on deep sandy red soils with very low rocky coverage.

Both the Kimberley Thornveld (SVk 4) and Vaalbos Rocky Shrubland (SVk 5) vegetation types are classified as least threatened as little has been transformed (SANBI, 2006-).

See vegetation map below indicating the vegetation types associated with the three separate proposed development areas.

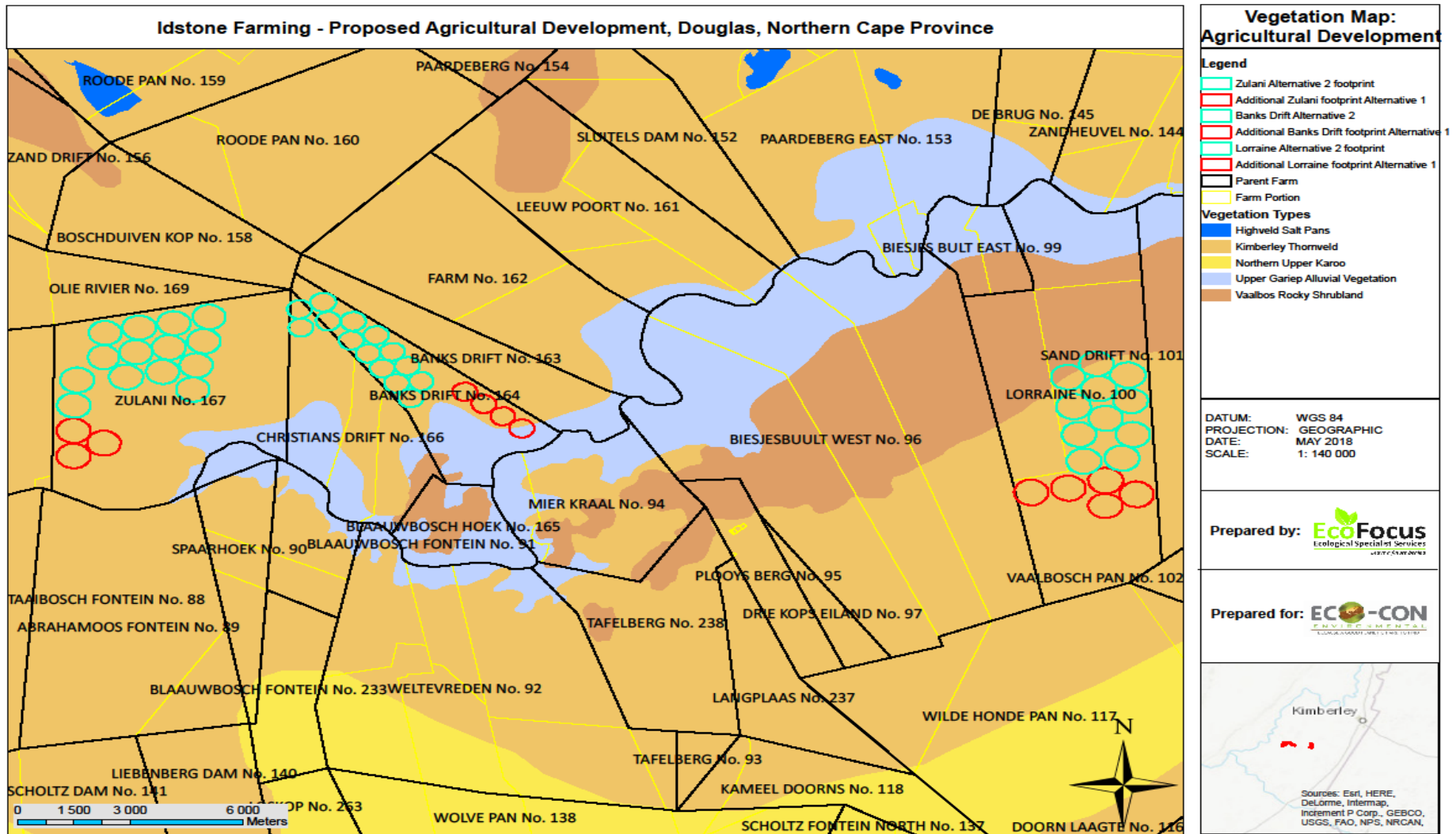


Figure 2: Vegetation map illustrating the vegetation types associated with the proposed three separate development footprint areas (see A3 sized map in the Appendices)

3.2. Conservation and Sensitivity Status

With reference to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP), which sets out biodiversity priority areas in this province:

- The 12 northerly situated proposed centre pivot land footprints of layout Alternative 2 of the Farm Zulani as well as the entire layout Alternative 2 of the Farms Banks Drift & Christians Drift (together) both affect ecosystems classified as Other Natural Areas (ONA).
- The most southerly situated centre pivot land footprint of layout Alternative 1 of the Farm Banks Drift falls within a Critical Biodiversity Area one (CBA 1) in accordance with the NCPSBP.
- The 2 most southerly situated proposed centre pivot land footprints of layout Alternative 2 as well as the additional centre pivot land footprints of layout Alternatives 1 of the Farm Zulani fall within a Critical Biodiversity Area two (CBA 2). The additional pivot lands of layout Alternative 1 of the Farms Banks Drift & Christians Drift (together) as well as the entire Farm Lorraine also fall within a Critical Biodiversity Area two (CBA 2).

Critical Biodiversity Areas are areas that are irreplaceable or near-irreplaceable (CBA 1), or reflect an optimum configuration (CBA 2) for reaching 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 CBA 2 associated with the three proposed development areas, mainly forms part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone while the Farm Lorraine additionally falls within the 10 km buffer zone surrounding the Mokala National Park to the south.

See sensitivity map below indicating the conservation status of areas associated with the three separate proposed development areas as well as the Mokala National Park 10 km buffer zone. The white areas represent existing agricultural pivot lands.

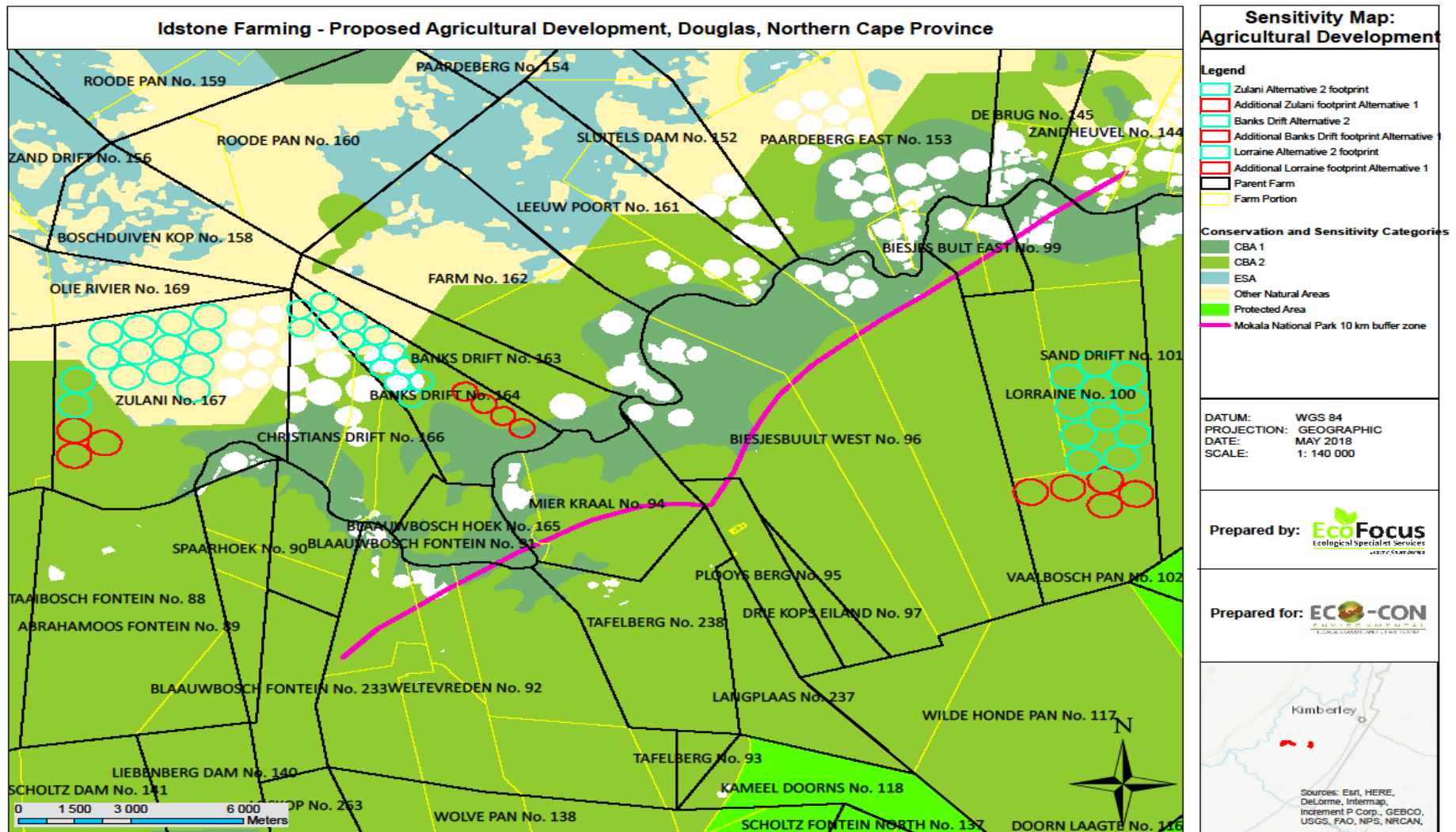


Figure 3: Sensitivity map illustrating the conservation and sensitivity status of areas associated with the proposed three development footprint areas as well as the Mokala National Park 10 km buffer zone (see A3 sized map in the Appendices)

4. Background, Scope and Context of the Proposed Three Developments

4.1. Project Ecological Assessment Background

Three separate Environmental Authorisation applications for Full Scoping and Environmental Impact Assessment processes were submitted to the Northern Cape Department of Environment and Nature Conservation (DENC, the competent authority) for the relevant three separate proposed developments. During the Scoping Phases of the proposed developments, Ecological and Avifaunal Assessments were conducted on each of the three proposed development areas. The main conclusions of the ecological assessments for the three separate proposed development areas are provided below (the full ecological assessment reports are included as appendices to the EIA Report):

4.1.1. Remaining Extent of the Farm Zulani no 167

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 (<http://www.iucnredlist.org/details/22695189/0>), 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 Areas (ONA) in accordance with the NCSBP. The southern development portion

however 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 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 scales 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 nationally and globally critically endangered African white-backed vulture. The area is considered to be of high conservation 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.

Table 1: Table summarising the main findings of the ecological assessment

Vegetation Type	Conservation Category	Nationally Protected Trees	Red Data Listed Species	Condition of Habitat
Kimberley Thornveld (SVk 4) (least threatened)	CBA 2 & ONA	<i>Vachellia erioloba</i> & <i>Vachellia haematoxylon</i> (approximately 14 400 trees)	Critically Endangered African white-backed vulture (<i>Gyps africanus</i>) (8 active nests)	Undisturbed, natural and relatively pristine. High PES value

In the opinion of the specialist, by application of the NEMA principles, which require first avoidance then minimisation of impacts, followed by rehabilitation/restoration (Mitigation Hierarchy), the significance of residual impacts associated with Alternative 1 through transformation of the CBA 2, destruction of nationally protected tree species and reduction in critically endangered bird species habitat cannot be reduced and mitigated to within acceptable levels. Remedy of residual negative impacts would not be feasible through biodiversity offsets in this case, given the high risk of these impacts being irreversible or leading to loss of irreplaceable resources. 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.

Alternative 2 will result in the most southerly situated three pivot lands of the southern development portion associated with the CBA 2 being left undeveloped. However, clearing of habitat

in the footprint of Alternative 2 is still likely to have a significant residual impact on the considerable numbers of nationally protected tree species and the critically endangered African white-backed vulture. The entire northern development portion will still be developed and this is the main portion housing the identified nests.

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 of Alternative 1.

The significance of the proposed development's impacts on protected trees and vultures could not be adequately mitigated to within acceptable levels. For this reason, measures to remedy the residual negative impacts must be found, namely by investigating the potential implementation of a biodiversity offset. A potentially suitable option would be for the applicant to make available an area of equivalent habitat which can be formally protected.

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

4.1.2. Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166

The proposed development will in all probability completely transform the existing surface vegetation on the proposed Banksdrift footprint area. The area forms part of a broad, continuous surrounding savannah landscape mainly associated with the Kimberley Thornveld vegetation type (SVk 4) and transitional zone into the Vaalbos Rocky Shrubland vegetation type (SVk 5). Only the most southern portion slightly intrudes into the Upper Gariiep Alluvial vegetation type (AZa 4) which is considered to be vulnerable (SANBI, 2006-). With the exception of the existing cultivated pivot lands, the veld and vegetation is in an undisturbed, natural and relatively pristine condition. The majority of the area therefore scored a high PES value while the development portion south of the ecological corridor scored a very 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 20 trees/ha which equates to a total estimate of approximately 5700 trees within the footprint area which will need to be removed.

The woody component of the area has the potential to house active nests of the African white-backed vulture (*Gyps africanus*), which is a Critically Endangered Red Data Listed species. No nests were specifically observed but the larger area provides suitable and important nesting habitat and foraging grounds. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area.

The northern portion of the proposed Banksdrift surface footprint area is classified as Other Natural Areas (ONA) in accordance with the NCSBP. The southern portion however falls within a Critical Biodiversity Area one (CBA 1) and 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 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 1 and CBA 2 ecological corridor and due to the significant presence of nationally protected tree species and the presence of the nationally and globally critically endangered African white-backed vulture nesting habitat and foraging grounds. The area is considered to be of high conservation significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, CBA and protected/Red Data Listed species.

Table 2: Table summarising the main findings of the ecological assessment

Vegetation Type	Conservation Category	Nationally Protected Trees	Red Data Listed Species	Condition of Habitat
Kimberley Thornveld (SVk 4) (least threatened); Vaalbos Rocky Shrubland (SVk 5) (least threatened) & Upper Gariep Alluvial (AZa 4) (vulnerable)	CBA 1, CBA 2 & ONA	<i>Vachellia erioloba</i> & <i>Vachellia haematoxylon</i> (approximately	Critically Endangered African white-backed vulture (<i>Gyps</i>	Undisturbed, natural and relatively pristine. High PES value

		5700 trees)	<i>africanus</i>) nesting habitat and foraging grounds (0 active nests)	
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In the opinion of the specialist, by application of the NEMA principles, the significance of residual impacts associated with Alternative 1 through transformation of the CBA 1 & CBA 2, destruction of nationally protected tree species and reduction in critically endangered bird species habitat cannot be reduced and mitigated to within acceptable levels. Remedy of residual negative impacts would not be feasible through biodiversity offsets in this case, given the high risk of these impacts being irreversible or leading to loss of irreplaceable resources. 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.

Alternative 2 will result in the southern development portion of the proposed project associated with the CBA 1 and some CBA 2 being left undeveloped. However, clearing of habitat in the footprint of Alternative 2 is still likely to have a significant residual impact on the considerable numbers of nationally protected tree species and the critically endangered African white-backed vulture habitat. The entire northern development portion will still be developed and this is the main portion containing nationally protected trees and critically endangered bird habitat.

The significance of the proposed development’s impacts on protected trees and vultures could not be adequately mitigated to within acceptable levels. For this reason, measures to remedy the residual negative impacts must be found, namely by investigating the potential implementation of a biodiversity offset. A potentially suitable option would be for the applicant to make available an area of equivalent habitat which can be formally protected.

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

4.1.3. Portion 1 of the Farm Lorraine no 100

The proposed development will in all probability completely transform the existing surface vegetation on the proposed Lorraine surface footprint area. 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 an undisturbed, natural and completely pristine condition. The area therefore scored a very high PES value.

The overwhelming dominant tree species present within the footprint area is *Vachellia erioloba* (nationally protected). The average density of trees within the footprint area amounts to approximately 20 trees/ha which equates to a total estimate of approximately 16 000 trees within the footprint area which will need to be removed.

Six 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 eleven 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 entire proposed Lorraine surface footprint area falls within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. The area also borders on the Mokala National Park to the south. The area forms part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone as well as the 10 km buffer zone surrounding the Mokala National Park. The Ecological Importance and Sensitivity (EIS) of the proposed Lorraine surface footprint area is classified as Class B (high) as it is ecologically important and sensitive on national scale for the persistence of the CBA 2 ecological corridor, maintaining the integrity of the buffer zone surrounding the Mokala National Park and due to the significant presence of nationally protected tree species and the presence of the nationally and globally critically endangered African white-backed vulture. The area is considered to be of high conservation 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.

Table 3: Table summarising the main findings of the ecological assessment

Vegetation Type	Conservation Category	Nationally Protected Trees	Red Data Listed Species	Condition of Habitat
Kimberley Thornveld (SVk 4) (least threatened)	CBA 2	<i>Vachellia erioloba</i> (approximately 16 000 trees)	Critically Endangered African white-backed vulture (<i>Gyps africanus</i>) (17 active nests)	Undisturbed, natural and relatively pristine. High PES value

In the opinion of the specialist, by application of the NEMA principles, the significance of residual impacts associated with Alternative 1 through transformation of the CBA 1 & CBA 2, destruction of nationally protected tree species and reduction in critically endangered bird species habitat cannot be reduced and mitigated to with

Although Alternative 2 will result in the transformation of approximately 250 ha less of existing natural vegetation than Alternative 1, it is the opinion of the specialist that, the significance of residual impacts associated with transformation of the CBA 2, loss of ecological integrity within the 10 km buffer zone of a National Park and destruction of nationally protected tree species and critically endangered bird species habitat cannot be reduced and mitigated to within acceptable levels for either alternatives. This must therefore be seen as a fatal flaw for the proposed project.

Furthermore, the development of either alternative is likely to lead to irreversible negative impacts and loss of irreplaceable resources at national if not global levels. These considerations therefore point to a fatal flaw for the proposed project, which should thus be seen as a 'no go'. It would not be feasible to provide adequate compensation for the range of significant residual negative impacts of the proposed development (either Alternative); for this reason, a biodiversity offset would not provide an acceptable remedy.

4.1.4. Ecological Impact Assessment Summary

The findings and conclusions of the ecological assessments indicated that Alternatives 2 of the proposed three separate developments would all pose potentially significant long term residual ecological impacts which, through application of avoidance and minimisation (in line with the NEMA principles) could not be suitably reduced to within acceptable levels namely:

- **Transformation of a pristine Critical Biodiversity Area two (CBA 2)** mainly associated with the Kimberley Thornveld vegetation type (SVk 4) and forming part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone. Portion 1 of the Farm Lorraine no 100 additionally falls within the 10 km buffer zone surrounding the Mokala National Park to the south. These areas would have to be cleared in order to make way for the proposed cultivated centre pivot lands.
- **Destruction/damage to a significant number of individuals of the nationally protected tree species *Vachellia erioloba* (Camel thorn) & *Vachellia haematoxylon* (Grey camel thorn)** which would have to be cleared in order to make way for the proposed cultivated centre pivot lands. Portion 1 of the Farm Lorraine no 100 is virtually devoid of any *Vachellia haematoxylon* (Grey camel thorn) individuals but is overwhelmingly dominated by *Vachellia erioloba* (Camel thorn).
- **Destruction/damage to nesting habitat and foraging grounds of a significant number of individuals of the nationally and globally Critically Endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture)** which mainly nest atop larger *Vachellia* trees. Significant numbers of large trees would have to be cleared in order to make way for the proposed cultivated centre pivot lands.

These potential long term ecological impacts were initially rated as high in accordance with the ecological assessment reports (see EIA Report appendices). After assessment of different alternatives for the proposed developments and consideration of possible measures to reduce negative impacts, the residual ecological impacts for the recommended Alternatives 2 were still rated as medium-high (see EIA Report appendices). Alternatives 1 of the Farms Zulani and Banks Drift as well as the entire Farm Lorraine development should not be considered further, since there is a high risk that they would lead to irreversible negative impacts and loss of irreplaceable biodiversity. Should the applicant decide to pursue Alternatives 2 of development on the Farms Zulani and Banks Drift, in accordance with the NEMA principles, a biodiversity offset would be needed to remedy the significant medium-high residual negative impacts.

4.2. Project Scoping Phase Approval and Recommendations

The findings and conclusions of the Ecological and Avifaunal Assessments were incorporated into three separate Scoping Reports for the proposed three developments and subsequently submitted to the competent authority for decision making. The Scoping Reports of all three proposed developments were approved on 23 March 2018 allowing the full EIA processes to continue. No specific conditions/recommendations were provided in the Scoping Report acceptance letters other than that the applicant “may accordingly proceed with undertaking the environmental impact assessment in accordance with the tasks that are outlined in the plan of study for the environmental impact assessment.”

The significant long term residual ecological impacts associated with the proposed developments triggered the requirement for a potential biodiversity offset to be investigated (as per the NEMA: Draft Biodiversity Offset Policy, 2017). After deliberation with the competent authority and Department of Agriculture Forestry and Fisheries (DAFF) representatives regarding the significant long term residual ecological impacts and subsequent way forward for the full EIA processes, it was recommended that an Offset Feasibility Study be conducted to assess potential options for remedying the ecological impacts of the proposed developments.

The objective of such a study must be to determine whether the potentially significant long term residual ecological impacts associated with the proposed developments can be adequately mitigated and compensated for, in accordance with the principles of NEMA, by means of provision and management of a suitable biodiversity offset area.

EcoFocus Consulting was therefore appointed by Eco-Con Environmental, who is the Environmental Practitioner (EAP) managing the full EIA processes, as an independent ecological specialist to conduct the required biodiversity offset feasibility assessment for the proposed developments.

5. Legislative Requirements

5.1. Constitution of the Republic of South Africa (Act 108 of 1996)

Section 24 of the Constitution of South Africa provides the main national legislative obligation towards sustainable environmental management and development. This section forms the foundation of all other subsequent environmental legislation and governance in South Africa. Section 24 states the following:

every person shall have the right -

- (a) to an environment that is not harmful to their health nor well-being; and
- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that -
 - (i) prevent pollution and ecological degradation;
 - (ii) promote conservation; and
 - (i) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

The following sections provide an overview of the relevant environmental legislation and guideline documents applicable to the proposed development.

5.2. National Environmental Management Act (Act 107 of 1998) (NEMA)

NEMA forms the principle/framework environmental legislation governing environmental management and development under the authority of the National Department of Environmental Affairs (DEA).

NEMA makes provisions for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment; institutions that will promote co-operative governance; procedures for co-ordinating environmental functions exercised by Organs of State and to provide for matters connected therewith.

Section 2 of NEMA establishes a set of principles, which apply to the activities of all Organs of State that may significantly affect the environment. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;

- Negative impacts must be minimised and positive impacts enhanced; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its entire life cycle.

The main 'biodiversity' principles which are key to this report include:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.
- That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised.
- That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.

These principles are taken into consideration when a Governmental Department needs to exercise its powers for example, during the processes of granting permits or Environmental Authorisations or the enforcement of existing legislation or conditions of approval.

The accepted Mitigation Hierarchy/Sequence for assessing and managing potential ecological impacts as embedded within the principles of Section 2 of NEMA, implies that significant ecological impacts must firstly be avoided/prevented. If this is not entirely possible, ecological impacts must be minimised or lastly, where negative impacts remain, must be rehabilitated or restored, and/or offset where rehabilitation/restoration does not fully remedy significant negative impacts.

The concept of biodiversity offset provision and management is therefore encapsulated within the NEMA Section 2 principles, and is viewed as a final potential alternative mitigation option for proposed developments.

In the case of the proposed developments, the findings and conclusions of the ecological assessments indicated that they would all potentially pose significant long term residual ecological impacts which could not be suitably reduced to acceptable levels.

5.3. National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) and its subsequent Threatened or Protected Species Regulations, 2013

NEMBA aims to provide for the management and conservation of the country's rich biodiversity within the framework of NEMA. It aids in the protection of species and ecosystems which warrant national protection and provides for the sustainable usage of the country's indigenous biological resources.

Sections 51 - 57 of NEMBA make provision for the protection of threatened or protected ecosystems and species. It also makes provision for threatening processes and restricted activities with regards to threatened or protected ecosystems and species, which are not allowed to be carried out without relevant permits being issued by a competent authority.

Section 1 of NEMBA lists picking parts of, or cutting, chopping off, uprooting, damaging or destroying, any specimen of a listed threatened or protected species as one of the restricted activities relevant to the proposed developments.

The purpose of the Threatened or Protected Species Regulations is to further regulate the permit application and approval system as set out in Chapter 7 of NEMBA insofar as that system applies to restricted activities involving specimens of listed threatened or protected species. Section 2(d) of the Threatened or Protected Species Regulations, 2013 lists habitat destruction a restricted activity.

In the case of the current proposed developments, the significant long term residual ecological impacts associated with the destruction/damage to a significant number of individuals of the nationally protected tree species *Vachellia erioloba* (Camel thorn) & *Vachellia haematoxylon* (Grey camel thorn) as well as subsequent nesting habitat and foraging grounds of a significant number of individuals of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) therefore triggers the biodiversity conservation and management principles in terms of permit requirements as set out in NEMBA.

The transformation of a pristine Critical Biodiversity Area two (CBA 2) mainly associated with the Kimberley Thornveld vegetation type (SVk 4) and forming part of a larger continuous ecological corridor associated with the Riet River catchment and riparian zone and the buffer zone surrounding the Mokala National Park to the south, also triggers the biodiversity conservation and management principles as set out in NEMBA.

5.4. National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy

The National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy was published for public comment on 31 March 2017 (Government Gazette No 40733, 31 March 2017). It will henceforth be referred to as ‘the policy’. Although the final policy has not been promulgated, it currently provides the latest and best available standardised and structured guidelines for dealing with potential biodiversity offset situations for proposed developments.

The main aim of the policy is to ensure that significant residual impacts of developments are remedied as required by NEMA, thereby ensuring sustainable development as required by Section 24 of the Constitution of the Republic of South Africa, 1996. This policy should be taken into consideration with every development application that still poses significant residual impacts after the mitigation sequence (avoidance, minimisation and rehabilitation/restoration) has been followed during the Environmental Impact Assessment process, and should be applied by taking the principles of NEMA into account.

In accordance with the policy, there are certain ecosystems in South Africa where there remains some flexibility in achieving biodiversity targets (i.e. these ecosystems are not highly threatened), and allowing some managed loss in exchange for greater protection and effective management of biodiversity. Significant residual impacts on biodiversity in these ecosystems which, after efforts to avoid, minimise and rehabilitate have been exhausted, need to be offset by legally securing other areas of that ecosystems for conservation and managing them for their biodiversity value through Protected Area declaration or by creating lasting servitudes.

Biodiversity offsets are also explicitly recognized in the National Biodiversity Framework (NBF), (gazetted in 2009); wherein the development of a national policy framework for biodiversity offsets and its application across the country is identified as one of its priorities. The NBF states that “In some cases, following avoidance and mitigation, there is still residual damage to biodiversity as a result of a development. In such cases, if the development is socially and economically sustainable, ecological sustainability may be achieved through a biodiversity offset. A biodiversity offset involves setting aside land in the same or a similar ecosystem elsewhere, at the cost of the applicant, to ensure no net loss of important biodiversity. Biodiversity offsets are particularly important in securing threatened ecosystems and critical biodiversity areas. They are already being implemented to some extent in South Africa, but in the absence of a legal or policy framework and thus with little

consistency. Systematic application of biodiversity offsets could provide significant benefits at little cost to the fiscus”.

5.4.1. NEMA: Draft Biodiversity Offset Policy Principles

In addition to the general principles set out in NEMA, which govern all environmental policy and making, Section 4 of the policy also sets out 14 specific principles which underpin the policy. These principles are more comprehensively discussed in Appendix 1.

1. The Ecosystem Approach
2. Offsets - the last resort in the Mitigation Sequence
3. Limits to what can or should be offset
4. Ecosystem protection
5. No Net Loss up to specified limits of acceptable change
6. Locating biodiversity offsets in the landscape
7. Equivalence – ‘like for like’
8. Additionality – new action required
9. Timing and duration of biodiversity offsets
10. Defensibility
11. Precaution
12. Fairness and equity
13. Non substitutable
14. Enforceable and auditable

5.4.2. NEMA: Draft Biodiversity Offset Policy Purpose

As per Section 5 of the policy, the desired outcome of biodiversity offsets is to ensure that:

1. The cumulative impact of development authorization and land use change does not:
 - result in the loss of CBA’s or jeopardize the ability to meet South Africa’s targets for biodiversity conservation;
 - lead to ecosystems becoming more threatened than ‘Endangered’; and/or
 - cause a decline in the conservation status of species and the presence of ‘special habitats’.
2. Conservation efforts arising from the development application process, and contributing to improved protection of South Africa’s unique species and ecosystems in perpetuity, are focused in areas identified as priorities for biodiversity conservation. Particular emphasis is on

consolidation of priority areas and securing effective ecological links between priority areas;
and

3. Ecosystem services provided by affected biodiversity and on which local or vulnerable human communities - or society as a whole - are dependent for livelihoods, health and/or safety, are at minimum safeguarded, and preferably improved.

5.4.3. NEMA: Draft Biodiversity Offset Policy, Offset Design and Location Guidelines

There is no single best approach to decide on designing and locating an appropriate offset. However, unless there is compelling reason not to follow this process, the following 7 steps in accordance with the policy, should constitute the offset design process:

1. Obtain a measure of the residual loss of biodiversity (i.e. residual negative impacts) as a consequence of the proposed development. This measure at minimum relates to the area and condition of affected ecosystem/ habitat;
2. Determine the best type of offset;
3. Determine the required size of offset and, where applicable, its optimum location;
4. Investigate candidate offset site(s) in the landscape that could meet the offset requirements. Check whether any eligible offset receiving area is suitable;
5. Decide on the best way to secure the offset, and ensure that the offset option would be acceptable to the CEA and the statutory conservation authorities;
6. Prepare an Offsets Report or dedicated section within the EIA report; and
7. Conclude agreements on offsets (between the applicant and an implementing agent) and develop an Offset Management Programme, where applicable.

Offsets should be located in the landscape to (in order or priority):

- Be in the same bioregion, vegetation or ecosystem type and, preferably, the same quaternary catchment as the impact site;
- Consolidate or buffer existing protected or priority conservation areas and/or minimize fragmentation of habitat;
- Make a maximum contribution to securing, protecting and/or linking biodiversity priority areas, and consolidating ecological corridors in the landscape identified in the provincial biodiversity plan, bioregional or other provincial or municipal biodiversity plans, SDF, EMF, fine scale plans, (etc.);
- Provide habitat for threatened species that would be adversely impacted; and
- Provide comparable ecosystem services specifically to those parties adversely affected by impacts on 'their' ecosystem services;

The policy also provides a table which provides appropriate basic offset size ratio recommendations/guidelines, based on the particular impacted biodiversity feature. Due to the policy still being reviewed and amended prior to final promulgation, this table only provides a draft size ratio guideline which will still be amended within the final policy. The table is thereof merely included in Appendix 2 for informative reference purposes.

5.5. National Forest Act (Act 84 of 1998) (NFA) and its subsequent List of Protected Trees, 2014

One of the main purposes of the NFA, as per Section 1(c), is to provide special measures for the protection of certain forests and trees.

Section 12(1)(d) of NFA allows for the Minister to declare trees belonging to a particular species as protected in which case, no activities as listed under Section 15 of NFA may be carried out without a license being issued by a competent authority. Section 15(1)(a) lists cut, disturb, damage or destroy as listed activities specifically relevant to the proposed development for which a license must firstly be obtained.

A List of Protected Trees was subsequently published in November 2014 in terms of Section 12(1) which declared certain tree species as formally protected.

In the case of the current proposed three developments, a significant number of individuals of the nationally protected tree species *Vachellia erioloba* (Camel thorn) & *Vachellia haematoxylon* (Grey camel thorn) would have to be cleared in order to make way for the proposed cultivated centre pivot lands. Portion 1 of the Farm Lorraine no 100 is virtually devoid of any *Vachellia haematoxylon* (Grey camel thorn) individuals but is overwhelmingly dominated by *Vachellia erioloba* (Camel thorn). Small numbers of individuals of the nationally protected tree species *Boscia albitrunca* (Shepherd's tree) were also identified but will not be significantly affected by the proposed three developments.

The long term residual ecological impact associated with the destruction of this significant number of nationally protected tree species would also trigger the requirement of a biodiversity offset to be investigated from DAFF's side. DAFF mainly relies on internal guidelines which stipulate that the removal of 2000+ mature individuals of a nationally protected tree species would warrant the investigation of a biodiversity offset area as a potentially suitable mitigation measure.

5.6. National Environmental Management: Protected Areas Amendment Act (Act 31 of 2004) (NEM:PAA) and its subsequent Norms and Standards for the Management of Protected Areas in South Africa, 2014

One of the main objectives of NEM:PAA, as per Section 2(a), is to provide for the declaration and management of protected areas. Section 9 of NEM:PAA provides for the different kinds of protected areas which can be declared.

Section 17 of NEM:PAA provides for the main purposes of declaring protected areas. One of the main purposes of declaring areas as protected, as per Section 17(e) of NEM:PAA, and which is specifically relevant to the proposed three developments, is to protect South Africa's threatened and rare species.

Section 20 of NEM:PAA further makes provision for the declaration of areas as National Parks while Section 23 makes provision for the declaration of Nature Reserves and Section 28 for Protected Environments.

Sections 38 - 43 of NEM:PAA provides for the management and monitoring requirements of protected areas. The Norms and Standards for the Management of Protected Areas in South Africa were subsequently published in July 2014 which further prescribe norms and standards for the management and development of protected areas.

In the case of the current proposed developments, a potential biodiversity offset would require declaration as a type of formal protected area as stipulated in Section 9 of the policy.

6. Assumptions, Limitations & Uncertainties

It is assumed that:

- If the Environmental Authorisations are approved, a suitable offset agreement will be reached between the applicant and state conservation authority. If this is however not the case, the conditional Environmental Authorisations will have to be withdrawn and the listed activities associated with the proposed developments will not be allowed to commence.
- As habitat conversion to agro-pastoral systems is indicted as one of the major contributors to decreasing numbers in vulture populations, it is assumed that the cumulative impact of the proposed developments on the greater Kimberley area vulture colonies would be relatively significant.
- Stationary and slow moving pivot infrastructure should not pose a significant collision risk for vultures due to their distinct visibility and relatively low heights.

Limitations of this study are that:

- The Mokala vulture colony survey was mainly conducted south of the Riet River so the assumption is made that the newest available data of Murn *et. al.*, (2017) therefore does not necessarily include the nests and individuals within the proposed Farms Zulani and Banksdrift development areas (which lie north of the river). Data deficiency on accurate population numbers of the broader areas therefore provides an uncertainty in determining the actual impact significance of such developments as it is evident that more vultures and nesting sites are present in areas north of the Riet River. More research and broader surveys within the greater Kimberley area are required in order to obtain accurate data with regards to holistic population numbers in the broader area.
- The Mokala colony is however the most relevant to the proposed Farms Zulani and Banksdrift development areas and its data was therefore partially relied on for offset ration calculations.
- The potential biodiversity offset areas will not compensate for, or remedy, the destruction of a significant number of the nationally protected tree species *Vachellia haemataxylon* which are well- represented within the proposed Farms Zulani and Banksdrift development areas. This species is virtually completely absent within the potential biodiversity offset areas. The competent authority in collaboration with DAFF, will have to determine whether this limitation within the potential biodiversity offset areas would be acceptable prior to approval of the Environmental Authorisation.
- The successful relocation, re-establishment and subsequent continued breeding of displaced individuals of the Critically Endangered African white-backed vulture cannot be guaranteed.

However, measures such as a phased removal of trees and re-establishment of trees and nesting habitat in bush encroached areas within the offset site as well as increased carrion availability could help to encourage this outcome over time.

7. Application of the NEMA Mitigation Hierarchy

The accepted Mitigation Hierarchy for assessing and managing potential ecological impacts as embedded within the principles of Section 2 of NEMA, implies that significant ecological impacts must firstly be avoided/prevented. If this is not entirely possible, ecological impacts must be minimised and then rehabilitated or restored. Where significant residual negative impacts remain after these measures have been exhausted, offsets would be required to remedy them. The NEMA Mitigation Hierarchy was applied to the proposed developments in the following manner:

7.1. Avoid/prevent and Minimise

The applicant owns a number of farms within a surrounding 45 km region of the proposed development areas. The overwhelming majority of the undeveloped farms owned by the applicant either fall within a Critical Biodiversity Area one (CBA 1) or Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. A minor portion of the farms to the north owned by the applicant falls within Ecological Support Areas (ESA) or Other Natural Areas (ONA).

The majority of the undeveloped farms owned by the applicant either fall within the Kimberley Thornveld (SVk 4) or Vaalbos Rocky Shrubland (SVk 5) vegetation types. The Kimberley Thornveld vegetation type (SVk 4) is mainly associated with the nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) as well as suitable habitat and soil conditions for the presence of the nationally protected tree species *Vachellia erioloba* (Camel thorn) & *Vachellia haematoxylon* (Grey camel thorn). In accordance with the information received from the applicant, there are also numerous vultures present on several of the other farms. Only small isolated portions of a number of farms owned by the applicant, which are traversed by significant watercourses, fall within the Upper Gariep Alluvial vegetation type (Aza 4). These portions however all either fall within a Critical Biodiversity Area two (CBA 2) or Critical Biodiversity Area one (CBA 1). See sensitivity map below indicating the conservation statuses associated with the applicant farm properties.

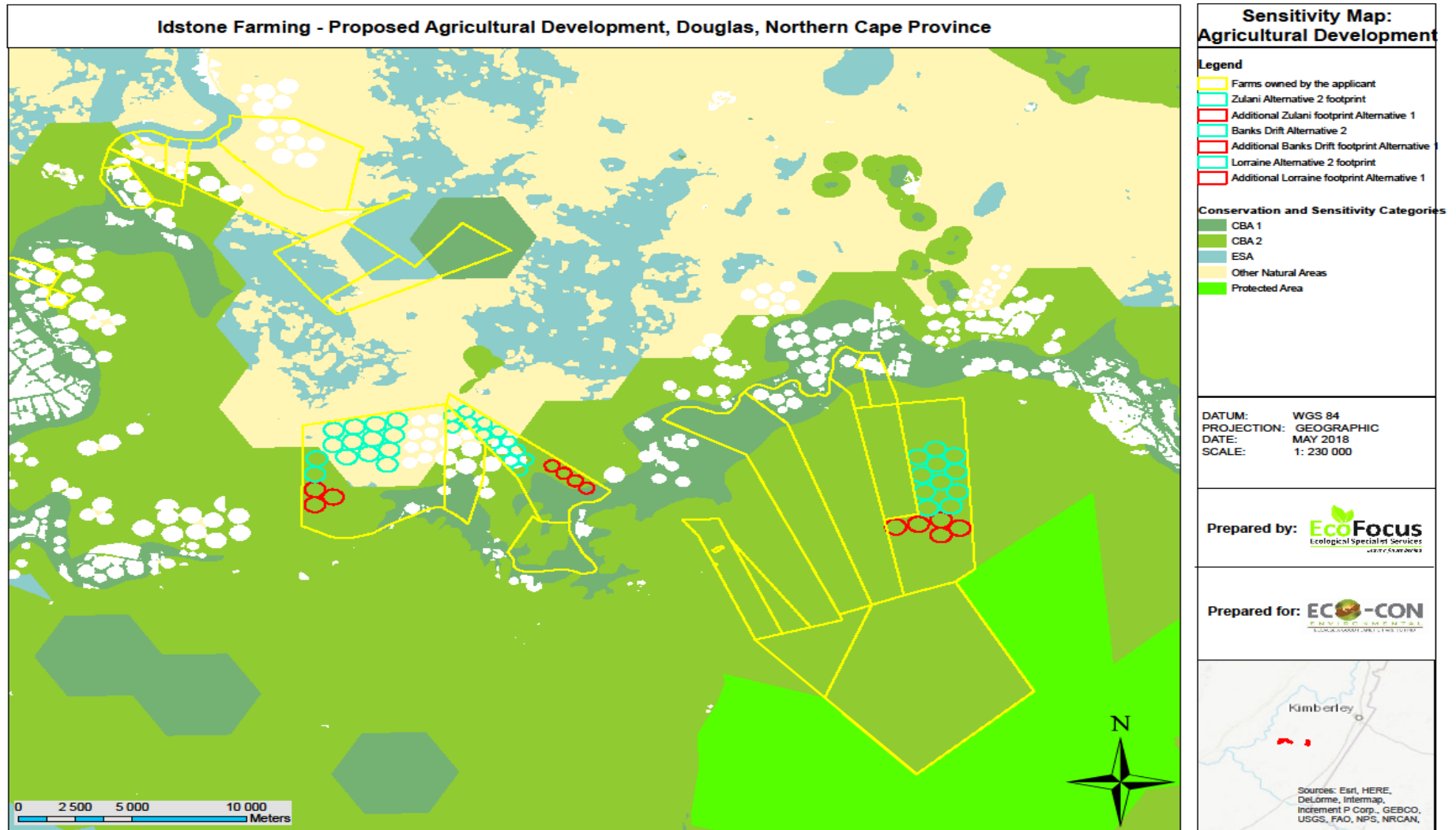


Figure 4: Sensitivity map illustrating the conservation and sensitivity statuses associated with the applicant farm properties (see A3 sized map in the Appendices)

From an alternative location point of view for the proposed developments, it is therefore evident that the applicant has limited options for developing on other sites/farms which would avoid or limit ecological impacts on CBAs or protected/Red Data Listed species as the majority of the farms contain similar ecological attributes.

Therefore given the significance of residual impacts and scope for mitigation (as discussed under heading 4.1.), it is recommended that Alternative 2 for the Farm Zulani and Alternative 2 for the Farms Banks Drift & Christians Drift be considered for development due to those alternatives mostly falling outside the CBA 2 and constituting relatively smaller development footprints. Pursuing these options would ensure that the direct footprint impact on the ecologically sensitive CBA 2 is avoided as far as practicably possible. It would also ensure that a proportion of the direct footprint impact on the nesting habitat and foraging grounds of critically endangered birds and on nationally protected trees could be avoided.

However, although Alternatives 2 for the proposed two developments would result in the transformation of 135 ha and 100 ha less of the existing natural vegetation respectively in comparison with Alternatives 1, they would still result in significant residual ecological impacts in the long term. In other words, the impacts of these developments could still not be reduced to acceptable levels (i.e. of low significance). For this reason, it would be essential to provide a biodiversity offset as a final mitigation step.

The entire Farm Lorraine falls within a CBA 2 which forms part of the 10 km buffer zone surrounding the Mokala National Park to the south. It also possesses nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) of which a significant number of nests and individuals are present within the area. The Farm Lorraine is virtually devoid of any *Vachellia haematoxylon* (Grey camel thorn) individuals but is overwhelmingly dominated by *Vachellia erioloba* (Camel thorn).

Although Alternative 2 of the Farm Lorraine will result in the transformation of approximately 250 ha less of existing natural vegetation in comparison with Alternative 1, it is in 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 (Mokala National Park 10 km buffer zone) and destruction of nationally protected tree species and critically endangered bird species habitat cannot be suitably reduced and mitigated to within acceptable levels for either alternatives. This must

therefore be seen as a fatal flaw for the proposed project. By not developing the Farm Lorraine, it will ensure that the direct footprint impact on the ecologically sensitive CBA 2 and transformation of critically endangered bird nesting habitat and foraging grounds as well as on the number of nationally protected tree individuals required to be removed is completely avoided.

7.2. Minimise by Reducing the Footprint of the Proposed Development and Avoiding the CBA2.

It is recommended that Alternatives 2 for the Farm Zulani and the Farms Banks Drift Christians Drift be considered for development due to those alternatives mostly falling outside the CBA 2 and constituting relatively smaller development footprints. This will ensure that the direct footprint impact on the ecologically sensitive CBA 2 is minimised. It will also ensure a decrease in the direct footprint impact on the transformation of critically endangered bird nesting habitat and foraging grounds as well as on the number of nationally protected tree individuals required to be removed.

The implementation of Alternatives 2 for the proposed two developments must be done following a systematic development approach. As the applicant follows an approximate seven to eight year rotation cycle on cultivation of pivot lands, it is recommended that the clearance of vegetation and cultivation of pivot lands on the proposed development areas be conducted incrementally on an annual basis. The total number of pivot lands to be cleared and cultivated must be split into the number of years required for the rotational cycle and must be progressively developed on an annual basis rather than developing the total number of pivot lands all at once. This will reduce the intensity and significance of the impacts on nesting habitat and foraging grounds for threatened birds, and should provide breeding pairs with the opportunity to relocate to other suitable areas as the disturbance caused by impacts systematically progresses.

It is further recommended that trees housing active nesting sites within Alternative 2 for the Farm Zulani are not removed during the breeding season, but rather outside the breeding and fledging period. A suitably qualified and experienced avifaunal specialist must be appointed annually, prior to the commencement of any new vegetation clearance and cultivation activities, in order to ensure that affected nesting sites do not house eggs or young chicks at the specific time of clearance.

Although Alternatives 2 for the proposed two developments will result in the transformation of 135 ha and 100 ha less of the existing natural vegetation respectively in comparison with Alternatives 1, they will still result in significant residual ecological impacts which will necessitate providing biodiversity offsets as a final mitigation step.

7.3. Rehabilitate or Restore

The applicant follows an approximate seven to eight year rotation cycle on cultivation of pivot lands. The applicant therefore rests and rehabilitates pivot lands after a single seasonal use until they are required again following completion of the full rotation cycle.

The current rehabilitation process followed by the applicant constitutes the active re-establishment of grasses on the pivot lands by planting of the grass species *Cenchrus ciliaris* & *Antheophora pubescens* after which such areas are grazed by livestock under low impact grazing practices. A site visit to such rehabilitated pivot lands, which have been dormant in excess of five years, was conducted on 21 May 2018. These rehabilitated pivot lands are mainly dominated by the grass species *Cenchrus ciliaris* but it is evident that significant grass and forb re-establishment of naturally occurring species from the surrounding landscape has taken place. The grass species *Eragrostis lehmanniana* is well represented in these pivot lands while other grass species also found to be present include *Schmidtia pappophoroides*, *Aristida spp*, *Pogonarthria squarrosa* & *Eragrostis superba*.

This rehabilitation approach followed by the applicant assists beneficially by accelerating the initiation of the ecological succession process and reinstating/restoring a degree of ecological functionality within the areas. The natural re-establishment/restoration of a woody component after use, which could provide suitable nesting habitat for threatened bird species, would however take a significant number of years to occur and cannot be achieved within the ecologically short timespan allowed by the pivot land rotation cycle.

Therefore, although the rehabilitation approach being followed by the applicant will provide a benefit by very slightly reducing the duration and magnitude of ecological impacts of the proposed developments, it will not be able to mitigate the significance of the long term residual ecological impacts associated with the destruction of nationally protected tree species and loss of nesting habitat for critically endangered bird species to an acceptable level.

Active re-establishment of large tree individuals as part of a potential future nesting habitat rehabilitation/restoration approach once the pivot lands have been retired from use (if ever), will also take a significant number of years to achieve. Successful return of critically endangered bird species into such rehabilitated areas can also not be guaranteed. Although habitat restoration must

take place in future once the pivot lands are retired from use (if ever), it is not viewed as being a suitable mitigation approach for the significant long term ecological impacts associated with the proposed developments.

7.4. Summary of Early Steps Followed in the NEMA Mitigation Hierarchy

It is concluded that the significance of long term residual ecological impacts cannot be adequately mitigated to within acceptable levels by measures to avoid, minimise and/or rehabilitate impacts. It is therefore essential to investigate a biodiversity offset to remedy these residual impacts, or apply the 'no-go' option.

In the case of Alternatives 2 for the Farm Zulani and the Farms Banks Drift & Christians Drift, the proposed developments are unlikely to lead to direct and permanent destruction of irreplaceable or near-irreplaceable biodiversity as no critically endangered bird individuals will be killed, in which case it would have constituted a fatal flaw. The proposed developments will however lead to some loss of CBA 2 area, significant loss of protected tree species as well as the permanent destruction of significant nesting habitat (although not necessarily unique) and subsequent displacement of a number of critically endangered birds. These residual negative impacts need to be remedied in order to satisfy the NEMA principles.

It is the opinion of the specialist that the significance of residual impacts associated with transformation of the CBA 2 (Mokala National Park 10 km buffer zone), destruction of nationally protected tree species and critically endangered bird species nesting habitat within either alternative proposal on the Farm Lorraine, cannot be mitigated to within acceptable levels. An offset in this situation would not be feasible as it could not remedy these impacts. This must therefore be seen as a fatal flaw for the proposed project.

8. Proposed Biodiversity Offset Areas

8.1. Summary of the Impacted Areas to be Mitigated by the Proposed Biodiversity Offset

Detailed discussions of the ecology of the proposed development impact areas is provided within Appendix 3. A concise summary of the main significant ecological features is provided below.

8.1.1. Alternative 2 of the Remaining Extent of the Farm Zulani no 167

Approximately **630 ha** of *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected) dominated savannah landscape will be completely cleared of surface vegetation and cultivated. This equates to approximately **12 375 trees** to be removed. The two most southerly pivot lands will also result in the transformation of approximately **90 ha of CBA 2**.

The broader directly and highly **impacted nesting habitat** and foraging grounds of the Critically Endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) will however be approximately **960 ha** in size including a minimum of **8 active nests**. This includes the remaining isolated portions of undeveloped land situated in-between the proposed pivot lands. The ecological integrity of these undeveloped portions will be significantly compromised by the ecological 'edge effect' caused by surrounding cultivated pivot lands and agricultural activities and these areas are therefore not viewed as being ecologically viable units of nesting habitat or foraging grounds. See the sensitivity map below. The areas directly to the east and north of the proposed development footprint house existing cultivated pivot lands and the R 357 provincial road respectively. These areas are therefore subject to continued disturbance and anthropogenic activities and should therefore not provide suitable nesting habitat and foraging grounds. The low height woody component and sparse savannah to the south also does not necessarily provide suitable nesting habitat for the African white-backed vulture (*Gyps africanus*). It however still provides important foraging grounds.

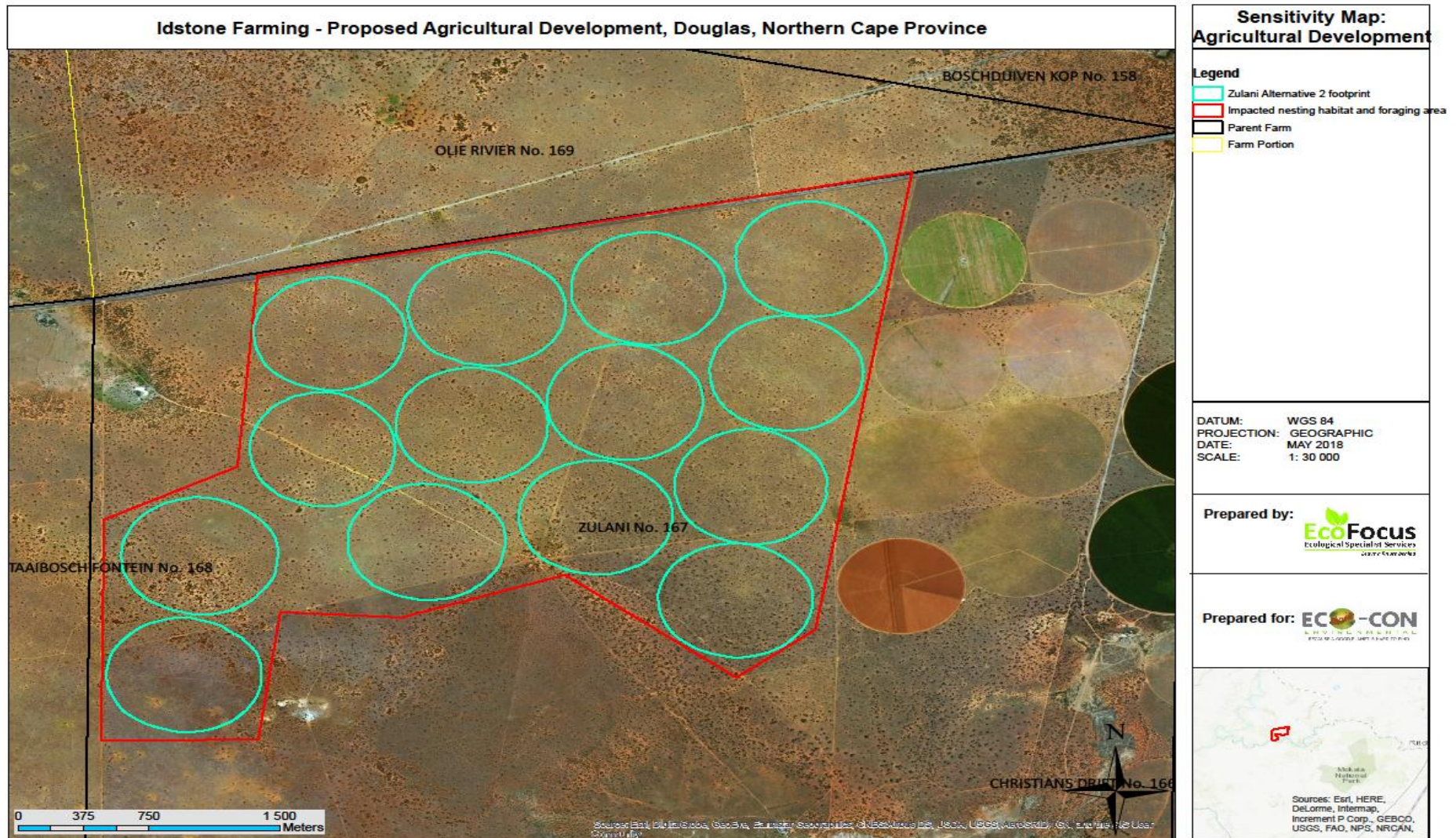


Figure 5: Sensitivity map illustrating the approximately 630 ha of pivot lands as well as the approximately 960 ha of broader directly and highly impacted nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture)

8.1.2. Alternative 2 of the Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166 (together)

Approximately **175 ha** of *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected) dominated savannah landscape will be completely cleared of surface vegetation and cultivated. This equates to approximately **3 500 trees** to be removed.

The broader directly and highly **impacted nesting habitat** and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) will however be approximately **290 ha** in size. This includes the remaining isolated portions of undeveloped land situated in-between the proposed pivot lands. The ecological integrity of these undeveloped portions will be significantly compromised by the ecological 'edge effect' caused by surrounding cultivated pivot lands and agricultural activities and these areas are therefore not viewed as ecologically viable units of nesting habitat or foraging grounds.

The 7 centre pivot lands within Alternative 2, which have been completely transformed due to the presence of two existing large cultivated pivot lands, have however not been included. They lack sufficient savannah structure and a well-developed woody component and are therefore not viewed as providing suitable nesting habitat for the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture). The areas directly to the south, west and north of the proposed development footprint house existing cultivated pivot lands and the R 357 provincial road respectively. These areas are therefore subject to continued disturbance and anthropogenic activities and should therefore not provide suitable nesting habitat and foraging grounds.

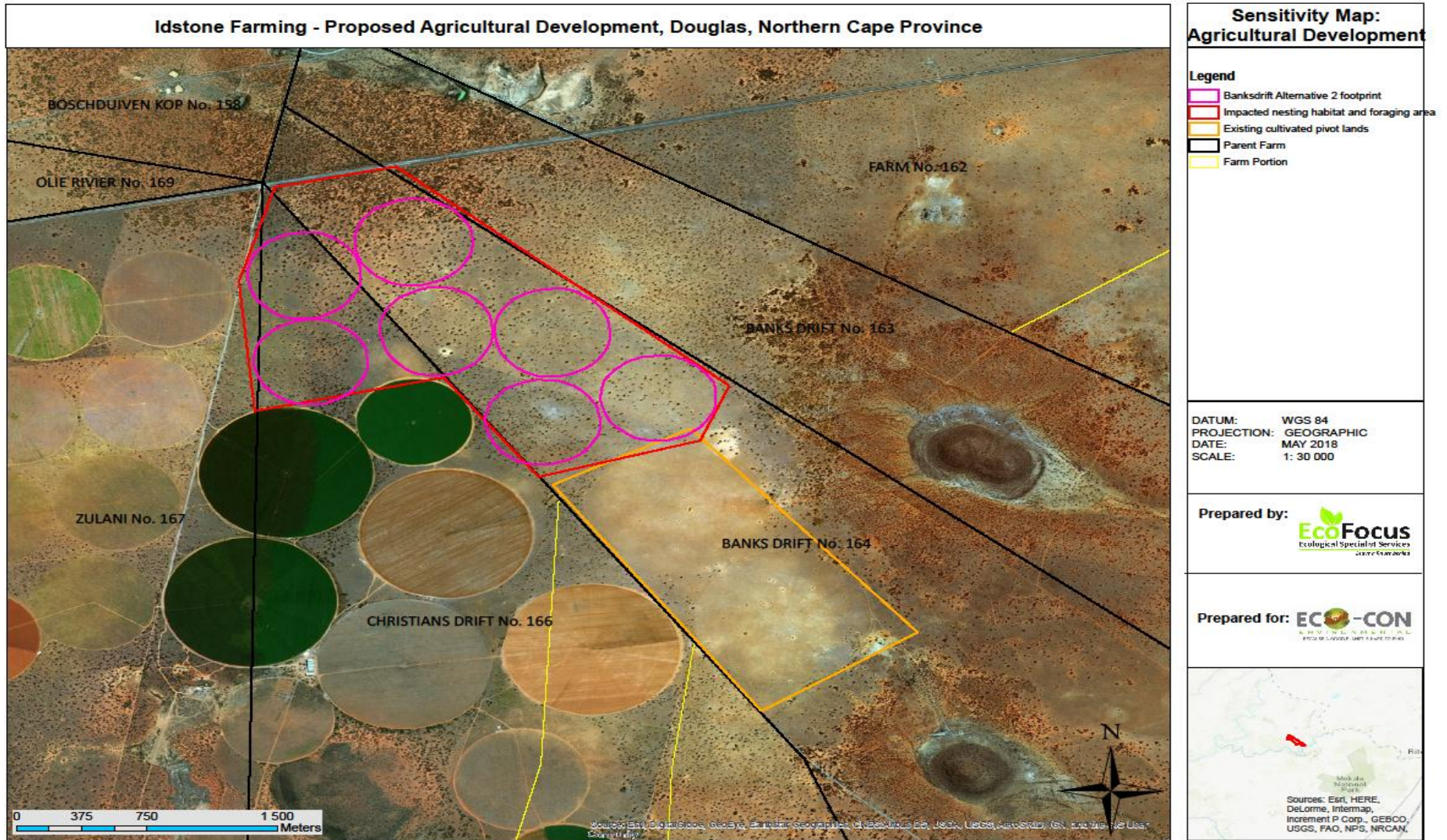


Figure 6: Sensitivity map illustrating the approximately 175 ha of pivot lands as well as the approximately 290 ha of broader directly and highly impacted nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture)

8.1.3. Combined Impacted Area Summary and Context

A combined total of approximately **15 875 individuals** of the nationally protected tree species ***Vachellia erioloba* & *Vachellia haematoxylon*** will have to be removed on approximately **805 ha** of Alternatives 2 of the Farm Zulani as well as the Farms Banks Drift & Christians Drift (together).

A total of approximately **90 ha of CBA 2** will be transformed on the Farm Zulani (associated with the most southerly situated 2 centre pivot lands). The CBA 2 forms part of the larger continuous CBA 2 ecological corridor associated with the Riet River catchment and riparian zone. Due to their significant distance away from the Riet River, these 2 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 of Alternative 1 (which is recommended to be excluded).

A combined total of approximately **1250 ha** of broader nesting habitat and foraging grounds including a minimum of **8 active nests** of the critically endangered Red Data Listed bird species ***Gyps africanus* (African white-backed vulture)** will be directly and significantly impacted upon by physical clearance of vegetation and compromising of their ecological integrity due to the ecological 'edge effect' caused by surrounding cultivated pivot lands and agricultural activities.

According to BirdLife International, (2017), the **global population** of the species has been estimated at **270 000 individuals**. The African white-backed vulture occurs from Senegal, Gambia and Mali in the west, throughout the Sahel region to Ethiopia and Somalia in the east, through East Africa into Mozambique, Zimbabwe, Botswana, Namibia and South Africa in the south. This species is the most widespread and common vulture in Africa, although it is now undergoing rapid declines. This species has declined by up to 90 % across parts of its range over the last 30 years (Murn *et al.*, 2017), but is apparently more stable in Ethiopia, Tanzania, Uganda (short-term increases [Pomeroy *et al.* 2012]) **and across southern Africa where an estimated 40 000 individuals remain** (BirdLife International, 2017). However it is suggested that if current levels of exploitation continue in South Africa, the species could become locally extinct by 2034 or sooner.

The species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution and poisoning. Although not necessarily as visible as habitat loss and degradation, the impacts of deliberate, as well as indiscriminate, poisoning are equally significant, devastating the

region's vulture populations and pushing the majority of this group closer to extinction. The gradual decrease in the available prey base is exerting additional pressure on raptors in the region. This has resulted from the replacement of wild ungulates with livestock as commercial farming activities have increased in the past four decades. In South Africa, the African white-backed vulture is one of the preferred vulture species in trade, according to a survey of traditional healers and traders. Electrocutation on power lines is also a problem in parts of its range, and it is vulnerable to nest harvesting or disturbance by humans; perhaps more so than *Gyps rueppellii*, as it breeds in trees rather than on inaccessible cliffs.

The **South African population** is estimated at around **9000 individuals** (Murn *et. al.*, 2002). During a 2001 aerial survey, **six breeding colonies** ranging from five to 135 km² in area were located in the **greater Kimberley area**, with an estimated **240 breeding pairs and 650 individual birds** (<https://www.birdlife.org.za> & Murn *et. al.*, 2002). Nest densities within colonies ranged from 0.32 to 0.61 nests per km² (mean 0.46/km²) (Murn *et. al.*, 2002). These six breeding colonies are named as follows:

- Dronfield
- **Riet River/Mokala (relevant to the proposed developments)**
- Paardeburg
- Secretarius
- Rivermead
- Susanna

If other reported colony sizes in the Northern Cape Province are accurate, it is possible that nearly **60 % of African white-backed vultures in the province breed around Kimberley** (Murn *et. al.*, 2002). The greater Kimberley area may therefore contain up to **7 % of the total population in South Africa, Lesotho and Swaziland** (Murn *et. al.*, 2002).

Table 4: Summary table of *Gyps africanus* (African white-backed vulture) population data

Item	Estimated figure	Percentage of Global Population	Percentage of South African Population
Global Population	270 000	-	-
Southern African Population	40 000	14.8 %	-
South African	9000	3.3 %	-

Population			
Greater Kimberley Area	650	0.2 %	7.2 %

A subsequent aerial survey was conducted on approximately 4000 km² during 2014 (Murn *et. al.*, 2017). According to Murn *et. al.*, (2017), a total of **165 active nests** was recorded across all six colonies, compared with 227 in 2001. Applying a correction factor to account for missed nests, the 2014 survey estimates the breeding population across the six colonies to be approximately **177 pairs** (165 × 1.075). The total of all nests (both active and inactive) counted was **219**. Across all six colonies, fewer (26 % less) nests were estimated compared with the 2001 estimate of 240 nests. Although nest density had decreased at colonies that had reduced in numbers of nests since the 2001 survey, average density across all extant colonies was 1.66 nests/km², which was more than three times higher than the average nest density across all colonies in 2001 (0.46 nests/km²).

Table 5: Comparison table between the aerial survey data of 2001 and 2014 (Murn *et. al.*, 2017)

Colony name	Aerial survey count of nests		% Change	Area (km ²)/density & (nests/km ²)	
	2001	2014		2001	2014
Dronfield	28	74	+264 %	135/0.32	162/0.46
Riet River/Mokala (relevant to the proposed developments)	69	55	-20 %	120/0.58	134/0.41
Rivermead	24	5	-79 %	50/0.48	1.6/3.12
Susanna	79	9	-88 %	130/0.61	55/0.16
Paardeburg	27	0	-100 %	66/0.41	0/0
Secretarius	NS(2)*	25	+1250 %	5/0.40	5.8/4.14
Totals	227	167	-26 %	-	-

A significant overall decline in the African white-backed vulture colonies is evident within the greater Kimberley area from 2001 to 2014. As the greater Kimberley area may contain up to 7 % of the total population in South Africa, Lesotho and Swaziland, this combined approximate 26 % reduction could constitute around 1.8 % reduction of the national population.

The Mokala colony survey was mainly conducted south of the Riet River so the assumption is made that the newest available data of Murn *et. al.*, (2017) therefore does not necessarily include the nests and individuals identified within the proposed development areas (which lie north of the river). The Mokala colony is however the nearest and most relevant to the proposed development areas and its data was therefore relied on for offset size calculations. The Mokala colony has shown an approximate 20 % reduction. Its nesting density has also decreased from 0.58 nests/km² to 0.41 nests/km².

Although possibly not included in the survey data of Murn *et. al.*, (2017), the removal of a minimum of eight active nests from the proposed development areas could constitute an impact on approximately 8 of 177 breeding pairs, which equates to around 4.5 % of the greater Kimberley area population. It could also constitute an impact on approximately 8 of 55 breeding pairs specifically from the Mokala colony, which equates to around 14.5 % of the Mokala colony population.

Biodiversity pattern will therefore be directly and significantly impacted upon while this will subsequently lead to an indirect impact on ecological processes as the African white-backed vulture is considered a key-stone species within the broader landscape.

8.2. Proposed Biodiversity Offset Location and Size

The proposed development areas constitute a combined total of approximately 1250 ha (12.5 km²) of broader directly and highly impacted vulture nesting habitat and foraging grounds including a minimum of 8 active nests associated with the specific Mokala colony (although possibly not included in the survey data of Murn *et. al.*, (2017)). The 1250 ha includes the total of approximately 805 ha of nationally protected tree species *Vachellia erioloba* & *Vachellia haematoxylon* (approximately 15 875 individuals) which will have to be removed (as discussed under heading 7.1.3).

A 'like for like' approach was followed in determining suitable locations for potential biodiversity offset areas by identifying areas with similar biodiversity pattern and ecological process components as the areas being impacted upon by the proposed developments. The potential biodiversity offset areas were, as far as practicably possible, located in close proximity to the proposed development areas. The potential biodiversity offset areas should at a minimum, provide suitable nesting habitat and foraging grounds mainly associated with the Kimberley Thornveld vegetation type (SVk 4) in order to ensure the presence of an adequate *Vachellia spp.* (specifically nationally protected species)

savannah landscape. Candidate offset sites should also house a significant number of active *Gyps africanus* (African white-backed vulture) nests in order to ensure that the area forms part of an existing viable active breeding colony.

The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status of candidate offset areas was further followed as far as practicably possible, by identifying potential biodiversity offset areas of greater value or priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments. The potential biodiversity offset areas should enable the expansion of and/or connectivity to existing formally protected areas. This will ensure the protection of ecological process on a broader ecosystem scale rather than in local isolation, which would subsequently lead to more ecologically efficient conservation of the impacted biodiversity pattern. The proposed development areas are predominantly classified as Other Natural Areas (ONA) in accordance with the NCSBP. The potential biodiversity offset areas should therefore be located within Critical Biodiversity Areas (CBA) as far as practicably possible, in order to enable meaningful contribution to the provincial and national biodiversity targets and conservation strategies.

The most up to date vulture colony figures and data as per Murn *et. al.*, (2017) were used as a baseline for calculating a potential offset size. The potential biodiversity offset area (which will be discussed under heading 8.3) mainly falls within the Mokala colony which has a current nest density of 0.41 nests/km². The 8 active nests would therefore require an approximate area of $8 \div 0.41$ nests/km² = 19.51 km² (1951 ha) within the Mokala colony to be ecologically viable. The Mokala colony area is however already currently occupied at a capacity of 0.41 nests/km². As per the data of Murn *et. al.*, (2017), the Mokala colony area had an initial nest density 0.58 nests/km². It is therefore reasonable to safely assume that the area could theoretically accommodate an increase in nest density of 0.17 nests/km². The 8 active nests would therefore require an additional area of approximately $8 \div 0.17$ nests/km² = 47.06 km² (4706 ha) in order to accommodate the increase in nest density within the Mokala colony area. A minimum total offset area of approximately **6657 ha** is therefore required within the Mokala colony area in order to be able to viably accommodate the additional 8 active breeding pairs if displaced.

In accordance with the newest revised draft version of the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy, it is proposed that an offset ratio of approximate 1:10 be used in the event of impacts on a CBA 2 and 1:2 for ONA's. Therefore, taking the

approximately 90 ha of CBA 2 and 715 ha of ONA's into account which will be transformed, the following additional calculations apply:

- 90 ha of CBA 2 X 1:10 offset ratio = **900 ha** of offset area required
- 715 ha of ONA X 1:2 offset ratio = **1430 ha** of offset area required

A **combined minimum biodiversity offset size of approximately 8987 ha** is therefore proposed in order to mitigate the significant long term residual ecological impacts associated with the proposed developments. The potential offset area must however be associated with the Mokala vulture colony and must provide a **minimum of approximately 6657 ha of suitable nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture)** which must consist of a *Vachcellia erioloba* and/or *V haemataxylon* dominated savannah landscape. It must also preferably be **located within a CBA** and/or in close proximity to existing formally protected areas.

The availability of carrion however also plays a significant limiting role when it comes to the capacity of breeding pairs which a specific area can accommodate. Provision of suitable nesting habitat through an offset which is already occupied by active breeding pairs, would therefore not necessarily completely atone for the loss of existing nesting habitat and foraging grounds. Additional mitigation measures for improving/re-establishing degraded habitat and increasing carrion availability in areas would also be required to increase the desired success of the potential offset over time.

8.3. Proposed Biodiversity Offset Areas

The applicant identified and made available five farm properties, of which two are sub-divided, to be assessed as potential biodiversity offset sites namely:

- The portion south of the Plooyberg road on the Remaining Extent of the Farm Plooy Berg no 95 (SG 21 Digit Code: C0320000000009500000) which is approximately 511 ha in size.
- Portion 1 of the Farm Drie Kops Eiland no 97 (SG 21 Digit Code: C0320000000009700001) which is approximately 312 ha in size.
- The Remaining Extent and Portion 1 of the Farm Wilde Honde Pan no 117 (SG 21 Digit Codes: C0320000000011700000 & C0320000000011700001) which is approximately 5499 ha in size.
- The portion south of the Plooyberg road on Portions 1 & 2 of the Farm Biesjesbuult West no 96 (SG 21 Digit Codes: C0320000000009600001 & C0320000000009600002) which is approximately 3464 ha in size.
- Portion 1 of the Farm Lorraine no 100 (SG 21 Digit Code: C0320000000010000001) which is approximately 2511 ha in size.

The combined total size of the five farm properties equates to approximately **12 297 ha**. See locality map below indicating the potential biodiversity offset properties.

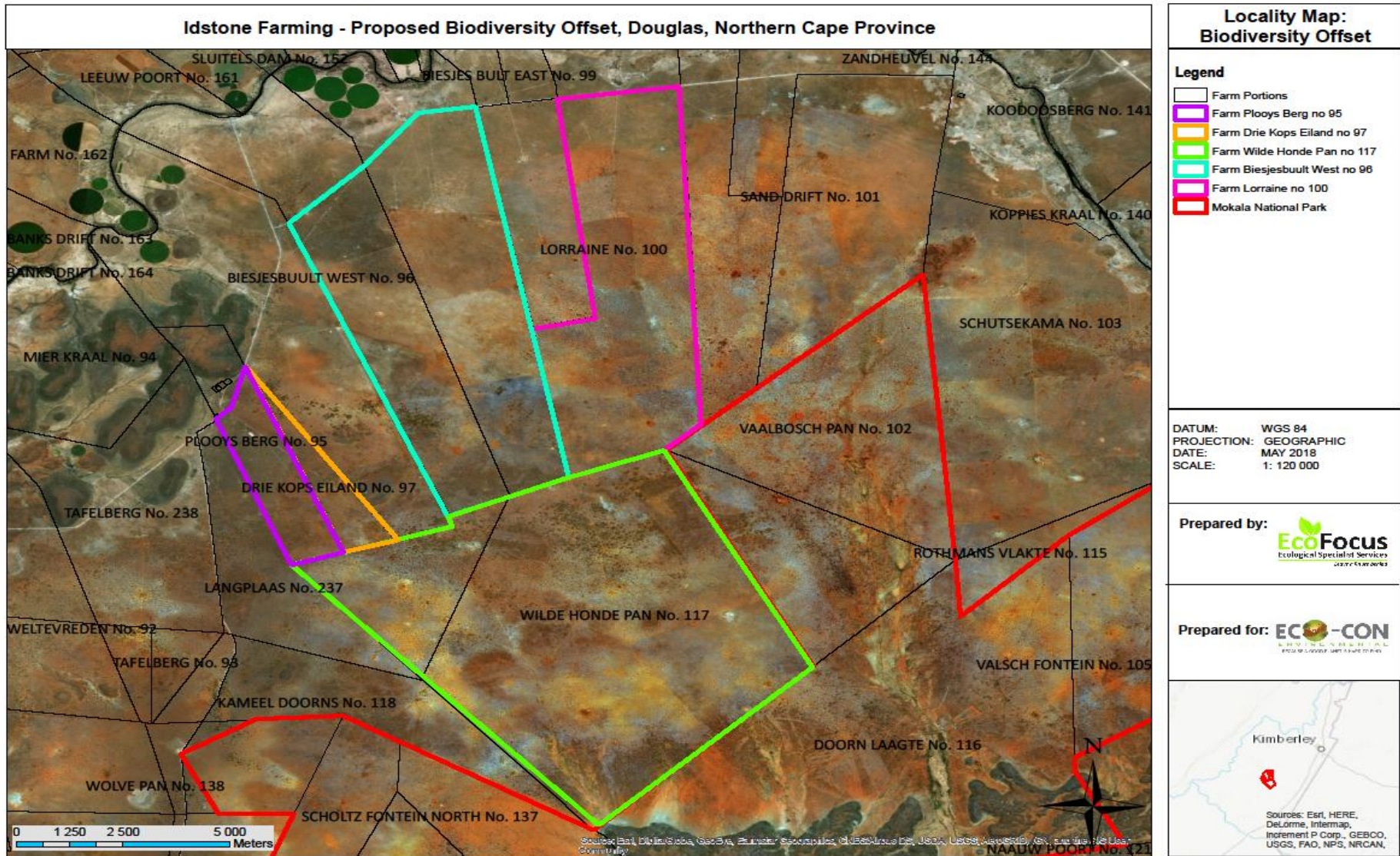


Figure 7: Locality map illustrating the locations of the potential biodiversity offset properties (see A3 sized map in the Appendices)

7.1.1. Vegetation Types

According to SANBI (2006-), the majority of the potential biodiversity offset properties fall within the Kimberley Thornveld vegetation type (SVk 4) similar to the proposed development areas.

The northern portions of the potential biodiversity offset properties fall within the Vaalbos Rocky Shrubland vegetation type (SVk 5).

A broad portion of the Northern Upper Karoo vegetation type (NKu 3) traverses the centre of the Remaining Extent and Portion 1 of the Farm Wilde Honde Pan no 117 in an east-west direction (SANBI, 2006-). This vegetation type mainly consists of flat to slightly sloping shrubland, dominated by dwarf karoo shrubs and sparse grasses. 'Ground truthing' during the site visit of the offset areas however suggests that this portion rather also forms part of the Kimberley Thornveld vegetation type (SVk 4) due to the presence of a distinct open savannah landscape.

All three of these vegetation types are classified as least threatened as little has been transformed (SANBI, 2006-).

See vegetation map below indicating the vegetation types associated with the potential biodiversity offset properties.

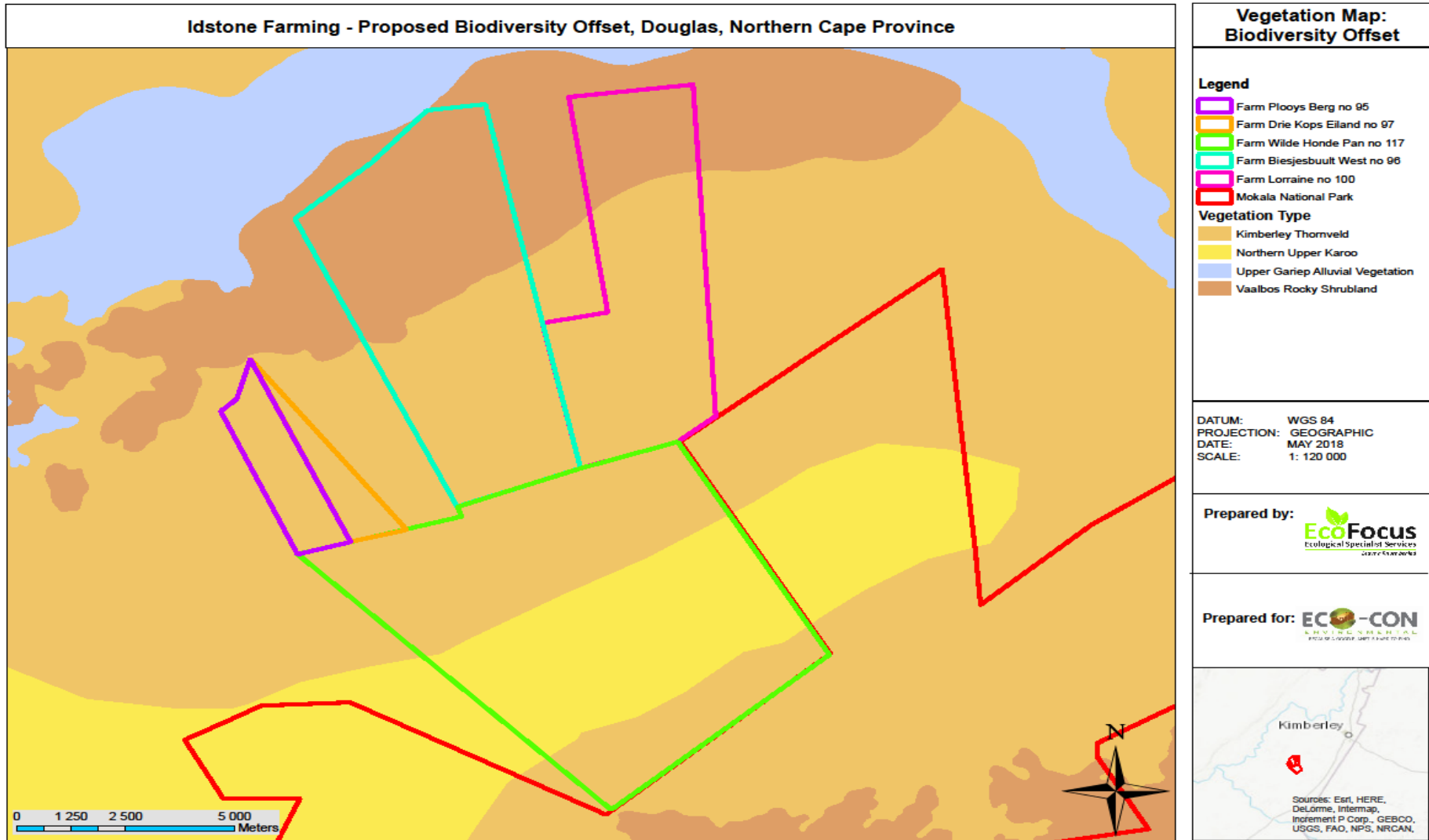


Figure 8: Vegetation map illustrating the vegetation types associated with the potential biodiversity offset properties (see A3 sized map in the Appendices)

7.1.2. Conservation and Sensitivity Status

All of the potential biodiversity offset properties fall within a Critical Biodiversity Area two (CBA 2) in accordance with the NCSBP. The CBA 2 associated with the potential biodiversity offset properties, forms part of the 10 km buffer zone surrounding the Mokala National Park to the south.

See sensitivity map below indicating the conservation status associated with the potential biodiversity offset properties as well as the Mokala National Park 10 km buffer zone.

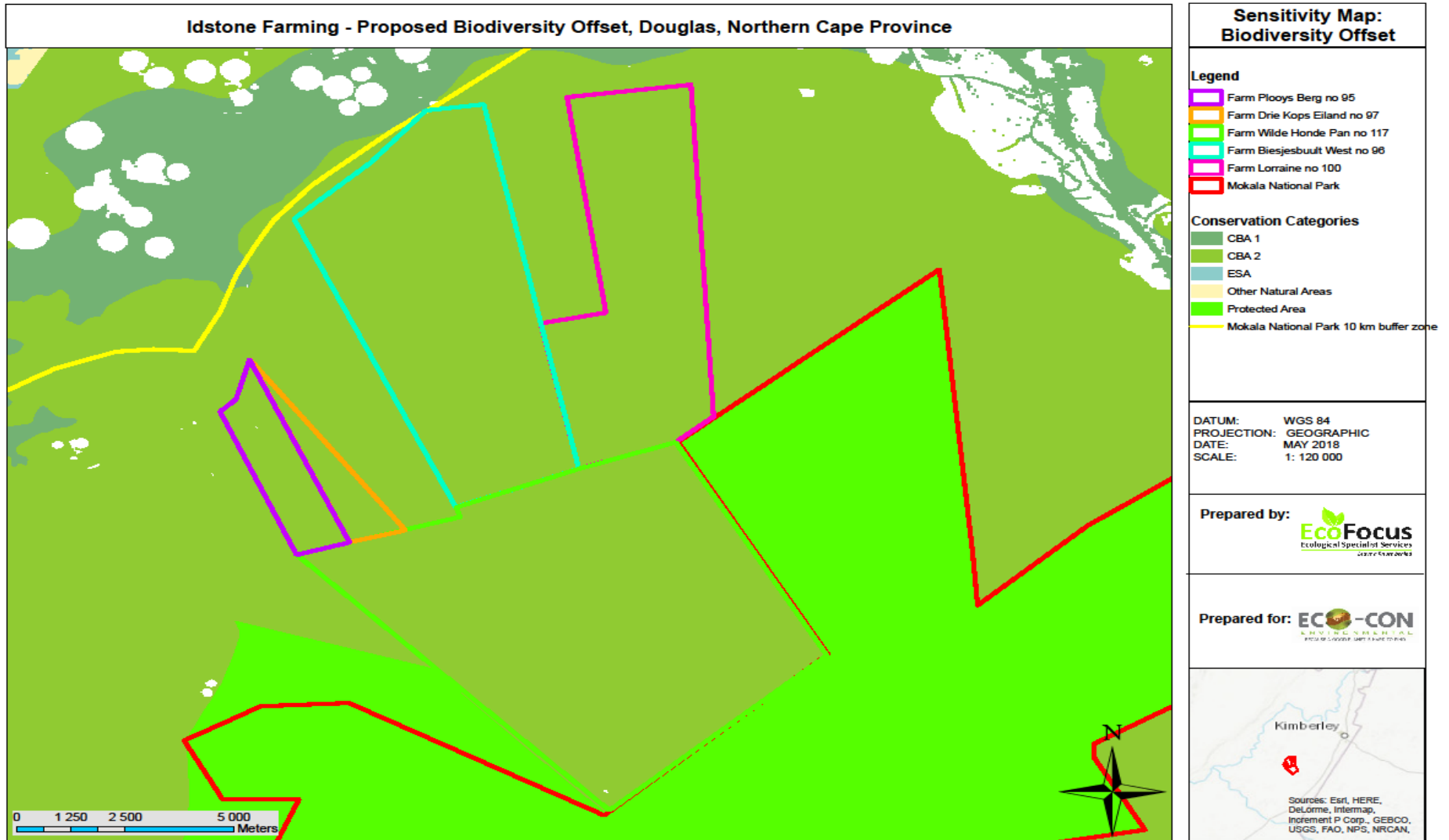


Figure 9: Sensitivity map illustrating the conservation status associated with the potential biodiversity offset properties as well as the Mokala National Park 10 km buffer zone (see A3 sized map in the Appendices)

7.1.3. Ecological Assessment Results

An ecological assessment was conducted of the relevant properties on 21 & 22 May 2018. The objective of the assessment was to determine the condition and value of biodiversity pattern and ecological process of the proposed biodiversity offset areas in order to enable comparison to that of the proposed development areas. This would advise on their suitability to serve the required biodiversity offset purposes as mitigation measure for the significant long term residual ecological impacts associated with the proposed developments.

The proposed biodiversity offset areas were assessed on foot and via a vehicle 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 if encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The potential biodiversity offset properties house three distinct vegetation structures on a broader landscape scale namely open savannah landscape, denser woody shrubland areas and open karroid shrub- and grassland areas.

7.1.3.1. Open savannah landscape

The open savannah landscape constitutes approximately 7427 ha of the total potential biodiversity offset areas. It consists of relatively homogenous flat to gently sloping areas of which the woody component mainly consists of single stemmed trees. Multi-stemmed trees or shrubs are however also well-represented in certain areas closer to the denser woody shrubland portions. The open savannah landscape 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. The soils mainly constitute deep sandy red soils with very low rocky coverage which is representative of the relevant vegetation type. A small ephemeral pan is also present within the open savannah landscape.

The overwhelming dominant tree species present within the open savannah landscape is *Vachellia erioloba* (nationally protected) while the tree species *Vachellia tortilis* is also present but to a significantly lesser extent. The average density of trees within the open savannah landscape amounts to approximately 20 trees/ha which equates to a total estimate of approximately 148 540 trees. Shrubs found to be present mostly include *Vachellia erioloba* (nationally protected). The species *Vachellia tortilis*, *Senegalia mellifera*, *Ziziphus mucronata*, *Grewia flava*, *Asparagus spp.*, *Ehretia rigida*, *Tarchonanthus camphoratus* & *Rhigozum trichotomum* are also present but to a significantly lesser extent. Forbs include *Crotalaria orientalis*, *Felicia spp.*, *Eriocephalus aspalathoides*, *Chrysocoma obtusata*, *Acrotome inflata*, *Helichrysum obtusum*, *Drimia spp.* (provincially protected) & *Oxalis semiloba* (provincially protected). The grass layer is dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana*, *Aristida diffusa* & *A congesta*. Other grasses include *Heteropogon contortus*, *Enneapogon cenchroides*, *Pogonarthria squarrosa*, *Stipagrostis obtusa* & *Eragrostis obtusa*.

The open savannah landscape forms part of the Mokala vulture colony and provides suitable nesting habitat and foraging grounds for the Critically Endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture). In excess of 60 individuals and 35 active nests of this species were encountered during the ecological assessment. It is however highly likely that there are even more active nests present in the area as the larger area provides important foraging grounds. Two breeding pairs of the near threatened Red Data Listed bird species *Sagittarius serpentarius* (Secretary Bird) were also found to be foraging within the open savannah landscape.

Relatively low impact livestock and game farming currently takes place within the open savannah landscape and the areas are therefore not subject to any continuous or significant anthropogenic disturbance. The area is also situated directly adjacent north of the Mokala National Park and therefore forms part of the broader ecosystem and biodiversity process which is being formally protected within the park. The open savannah landscape therefore provides a suitable and important habitat for strategic and broader ecological conservation of biodiversity pattern in terms of nationally protected tree- and critically endangered bird species as well as subsequent biodiversity process associated with the important ecological role/niche being occupied by these keystone species.



Figure 10: Two images illustrating the landscape of the open savannah landscape associated with the proposed biodiversity offset areas



Figure 11: Image illustrating the presence of the small ephemeral pan within the open savannah landscape

7.1.3.2. Denser woody shrubland areas

The denser woody shrubland areas constitute approximately 1529 ha of the total potential biodiversity offset areas. They mainly consist of relatively distinct and confined rocky intrusions within the broader savannah landscape where linear rocky ridges manifest on the surface. The soil surface rockiness is therefore increased and soil depth decreased in such portions. These areas house an increased density of the woody component. Individuals of the nationally protected tree species *Vachellia erioloba* are mainly absent from- or sporadically present within these areas and the woody dominance is replaced by an increase in density of multi-stemmed shrubs and trees such as *Senegalia mellifera*, *Vachellia tortilis*, *Ziziphus mucronata*, *Grewia flava* *Tarchonanthus camphoratus* & *Rhigozum trichotomum*. Individuals of the nationally protected tree species *Boscia albitrunca* were also found to be sporadically present within these areas.

Certain portions within the surrounding deeper red sandy soil areas also house denser woody shrubland areas. Such areas within the deeper red sandy soils are however evidently associated with a degree of historic overgrazing which has triggered a level of bush encroachment. The applicant has been actively implementing bush encroachment alleviation and management measures in affected areas over the past growing season and continues to do so, on a systematic basis. Active bush encroachment alleviation and management measures are also being implemented by the applicant within CBA 1 areas on the other farms owned by the applicant. Herbicides are being actively applied to small and medium height multi-stemmed individuals of the woody species *Senegalia mellifera*,

Vachellia tortilis & *Prosopis spp.* within densely encroached areas. Significant care is however being taken to avoid any impact on *Vachellia erioloba* individuals within the areas.

The denser woody shrubland areas do not necessarily provide suitable nesting habitat for the Critically Endangered African white-backed vulture due to the lack of larger *Vachellia spp.* tree individuals. These areas however still form part of their foraging grounds as these areas provide locally distinct habitat and refuge to various faunal prey species (for decomposers) which do not necessarily thrive within the open savannah landscape. The active bush encroachment alleviation and management measures being implemented by the applicant within historically overgrazed areas should also, in the long term, lead to the improvement of nesting habitat. Active re-establishment of *Vachellia erioloba* trees and subsequent nesting habitat restoration in such overgrazed bush encroached areas must however also be implemented as additional mitigation measures to increase the desired success of the potential offset over time.





Figure 12: Two images illustrating the landscape of the denser woody shrubland areas associated with the proposed biodiversity offset areas

7.1.3.3. Open karroid shrub- and grassland areas

The open karroid shrub- and grassland areas constitute approximately 3341 ha of the total potential biodiversity offset areas. The areas are mainly situated on shallow calcrete banks which have resulted in shallow soils being present. The absence of deep soils has subsequently resulted in a lack of a well-established woody component and savannah landscape. The areas are mainly dominated by a low growing karroid shrubby grass layer. Certain portions towards the south and closer to the denser woody shrubland areas however contain higher densities of low growing woody shrub species such as *Grewia flava* & *Tarchonanthus camphoratus*. A well-established tall woody component is however still absent. A small ephemeral pan is also present within the open karroid shrub- and grassland areas.

The open karroid shrub- and grassland areas do not necessarily provide suitable nesting habitat for the Critically Endangered African white-backed vulture due to the lack of larger *Vachellia spp.* tree individuals. These areas however still form part of their foraging grounds as these areas are utilised by various faunal species which serve as potential prey (for decomposers).



Figure 13: Two images illustrating the landscape of the open karroid shrub- and grassland areas associated with the proposed biodiversity offset areas



Figure 14: Two images illustrating the southern landscape of the open karroid shrub- and grassland areas which contain higher densities of low growing woody shrub species such as *Grewia flava* & *Tarchonanthus camphoratus*



Figure 15: Image illustrating the presence of the small ephemeral pan within the open karroid shrub- and grassland areas

The results map below illustrates the locations of denser woody shubland as well as open karroid shrub- and grassland areas within the broader continuous open savannah landscape associated with suitable nesting habitat and foraging grounds for the Critically Endangered African white-backed vulture.

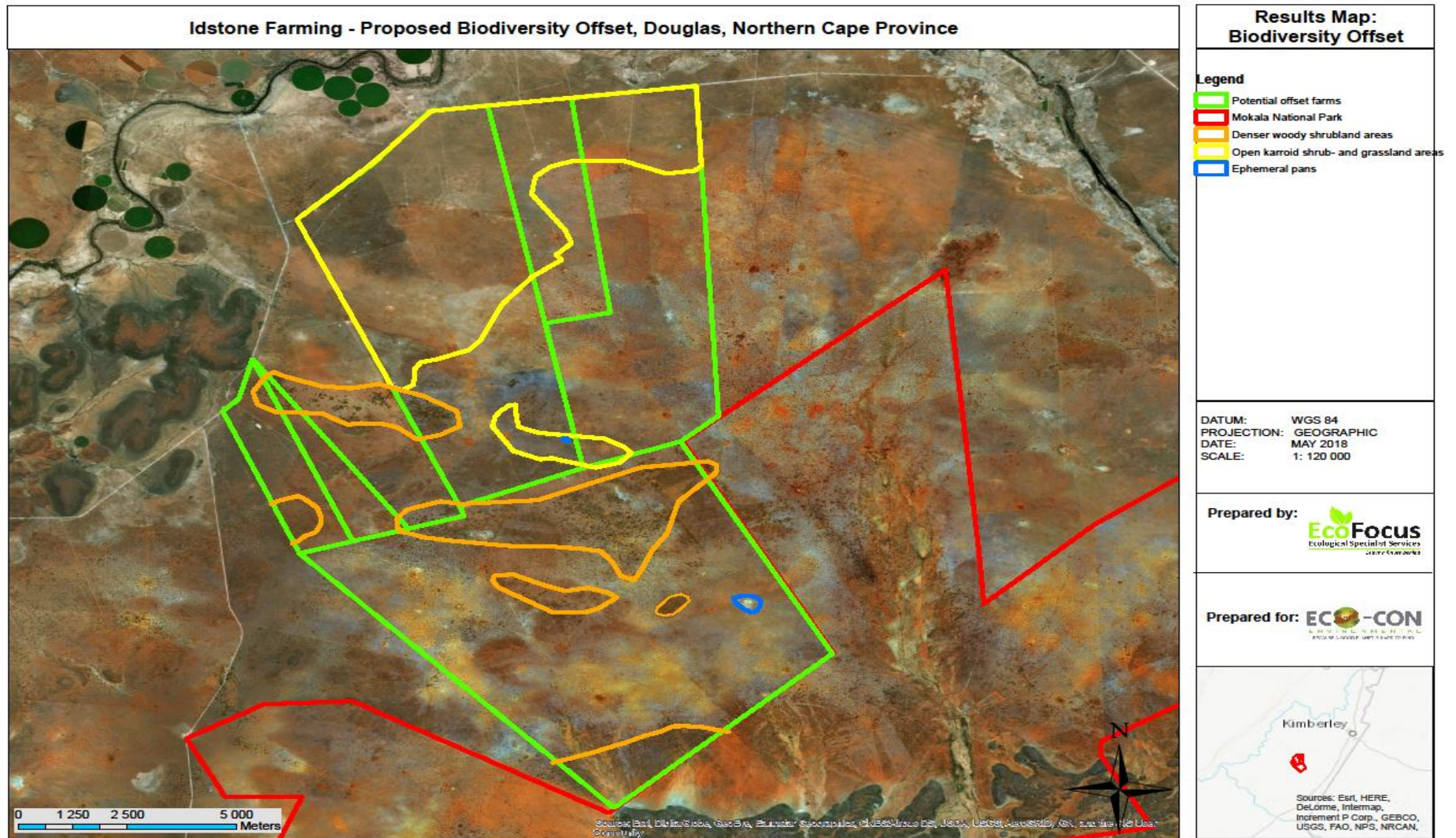


Figure 16: Results map illustrating the locations of denser woody shrubland as well as open karroid shrub- and grassland areas within the broader continuous open savannah landscape

7.1.3.4. Ecological Assessment results summary

The combined total size of the offset properties equates to approximately 12 297 ha. The potential biodiversity offset areas, provide a large continuous portion of open savannah landscape of approximately **7427 ha** in size which is in a natural, relatively pristine condition. The open savannah landscape forms part of the Mokala vulture colony and provides **suitable nesting habitat and foraging grounds for the Critically Endangered African white-backed vulture**. In excess of **60 individuals and 35 active nests** of this species were encountered during the ecological assessment. The open savannah landscape also houses approximately **148 540 individuals of the nationally protected tree species *Vachellia erioloba***.

The potential offset area is situated directly adjacent north of the Mokala National Park and therefore forms part of the broader nesting habitat and foraging grounds of the Mokala vulture colony. A 'like for like' potential biodiversity offset area is therefore evident with similar and even improved biodiversity pattern and ecological process components as that of the areas being impacted upon by the proposed developments.

Although the denser woody shrubland as well as open karroid shrub- and grassland areas do not necessarily provide suitable nesting habitat for the Critically Endangered African white-backed vulture due to the lack of larger *Vachellia spp.* tree individuals, these areas form part of their foraging grounds. They therefore still add significant value to the broader ecosystem and biodiversity process.

All of the potential biodiversity offset properties fall within a Critical Biodiversity Area two (CBA 2) associated with the buffer zone surrounding the Mokala National Park. The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status for the potential biodiversity offset areas is therefore evident as the potential biodiversity offset areas are of greater value and priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments.

The potential biodiversity offset areas, are considered to be of high conservation 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. The formal protection of these areas will therefore meaningfully contribute to the provincial and national

biodiversity targets and conservation strategies by significantly expanding the size of formally protected areas surrounding the Mokala National Park.

The average nest density of the greater Kimberley area (1.66 nests/km²) suggests that there is potential scope for further increase in nest density within the offset area and subsequent Mokala colony. The availability of carrion however also plays a significant limiting role when it comes to the capacity of breeding pairs which a specific area can accommodate. Provision of suitable nesting habitat through the offset which is already occupied by active breeding pairs, would therefore not necessarily completely atone for the loss of existing nesting habitat and foraging grounds. Additional mitigation measures for improving/re-establishing degraded habitat and increasing carrion availability in areas would also be required to increase the desired success of the potential offset over time.

The active bush encroachment alleviation and management measures being implemented by the applicant within historically overgrazed areas should, in the long term, lead to the improvement of nesting habitat. Active re-establishment of *Vachellia erioloba* trees and subsequent nesting habitat restoration in such overgrazed bush encroached areas must however also be implemented as additional mitigation measures to increase the desired success of the potential offset over time.

An increase in nest density could potentially also be encouraged within the offset area by increasing the availability of food sources such as incorporating additional vulture 'restaurants' for monitoring purposes. Carrion provided may however not be contaminated by any agricultural remedies known to be poisonous or detrimental to the health of vultures. It is however recommended that a meeting be held with Vulture Research Group in order to agree on the most effective way of addressing this potential mitigation measure and determine the way forward.

Table 6: Table indicating a summary and comparison of the ecological assessment results

Vegetation Type		Conservation Category		Nationally Protected Trees		Red Data Listed Species		Condition of Habitat	
Impacted areas (1250 ha)	Biodiversity offset areas (12 297 ha)	Impacted areas (1250 ha)	Biodiversity offset areas (12 297 ha)	Impacted areas (1250 ha)	Biodiversity offset areas (12 297 ha)	Impacted areas (1250 ha)	Biodiversity offset areas (12 297 ha)	Impacted areas (1250 ha)	Biodiversity offset areas (12 297 ha)
Kimberley Thornveld (SVk 4) (least threatened)	Kimberley Thornveld (SVk 4) (least threatened) Vaalbos Rocky Shrubland (SVk 5) (least threatened) Northern Upper Karoo (NKu 3) (least threatened)	CBA 2 & ONA	CBA 2	<i>Vachellia erioloba</i> & <i>Vachellia</i> <i>haematoxylon</i> (approximately 14 400 trees)	<i>Vachellia</i> <i>erioloba</i> (approximately 148 540 trees)	Critically Endangered African white- backed vulture (<i>Gyps africanus</i>) (8 active nests)	Critically Endangered African white- backed vulture (<i>Gyps</i> <i>africanus</i>) (in excess of 35 active nests)	Undisturbed, natural and relatively pristine. High PES value	Undisturbed, natural and relatively pristine. High PES value

8.4. Proposed Biodiversity Offset Type

In accordance with Section 9.5 of the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy, offsets can be secured through any of the following means:

- Land donation by the applicant to an appropriate statutory conservation authority or a PBO approved by the CEA and willing to receive such land;
- Conservation servitudes (e.g. stewardship agreements, or the purchase and retirement of development rights) entered into between the applicant, landowner and the state conservation authority; and
- Purchase or other acquisition of land or rights to land by the applicant for either of the above purposes;

In all of the above cases, adequate financial provisions would have to be provided by the applicant for the effective ecological management of the offset areas for a minimum 30 year period.

In the case of the proposed developments, a pre-submission EIA meeting was conducted with representatives of the Mokala National Park, SANParks and the competent authority on 21 May 2018. During this meeting various options with regards to suitable offset types were discussed. It was indicated by the applicant during the meeting that land donation or any purchase or acquisition of land by the applicant for the securing of the potential biodiversity offset areas would not pose a financially viable option.

Therefore, although donation of offset land and expansion of the Mokala National Park to incorporate this land would provide significant conservation benefit, this option could not be considered for the purposes of this Biodiversity Feasibility Report. Another effective means of preserving the biodiversity values on the offset sites in the long term therefore had to be investigated and proposed in terms of Section 9.5 of the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy. Another effective means of preserving the biodiversity values on the offset sites in the long term therefore had to be investigated and proposed in terms of Section 9.5 of the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy.

The most feasible option/approach for securing the biodiversity offset areas is to enter into a stewardship agreement between the applicant and the state conservation authority. It is proposed that the potential biodiversity offset areas be **formally declared as a Nature Reserve** in accordance

with Section 23 of NEM:PAA. This would provide the opportunity and benefit of expanding provincial protected areas as well as contributing to reaching provincial and national biodiversity targets for protecting South Africa's threatened or rare species (Section 17(e) of NEM:PAA). This approach would further ensure the protection of ecological process on a broader ecosystem scale rather than in local isolation, which would subsequently lead to more ecologically efficient conservation of the impacted biodiversity pattern.

Should the biodiversity offset be set aside as a Nature Reserve, a specific management authority would have to be assigned. Section 38(2) of NEM:PAA allows for the MEC to assign the management of a Nature Reserve to a suitable person, organisation or organ of state. A Management Plan would also have to be compiled in accordance with which a Nature Reserve must be adequately managed. Section 39 - 41 of NEM:PAA makes provision for the compilation of such a Management Plan. The objective of the Management Plan is to ensure the protection, conservation and management of the protected area concerned in a manner which is consistent with the objectives of the Act and for the purposes it was declared. The Management Plan must be submitted to the MEC within 12 months of the assignment of the management authority. Such a Management Plan must be compiled by a suitably qualified and experienced specialist. Annual monitoring of the Nature Reserve in accordance with the Management Plan performance criteria is further required in terms of Section 43 of NEM:PAA. This will ensure that the Nature Reserve is adequately managed in terms of the conditions as set out in the declaration and Management Plan.

It is therefore the opinion of the specialist that the declaration and management of a Nature Reserve in accordance with these NEM:PAA requirements should ensure the effective and adequate management of the potential biodiversity offset areas as a suitable mitigation measure for the significant long term residual ecological impacts associated with the proposed developments.

If the Environmental Authorisations for Alternatives 2 of the proposed two developments were approved, it is recommended that an official offset agreement negotiation meeting between the applicant and state conservation authority be conducted as soon as practicably possible. The objective of this meeting must be, as far as practicably possible, to finalise the offset agreement and prove/confirm the applicants consent and intent of declaration.

Recommendations in terms of the Environmental Authorisation conditions and offset agreement

If the Environmental Authorisations for Alternatives 2 of the proposed two developments were approved, the following main items are recommended as part of the approval conditions and official offset agreement:

Environmental Authorisation conditions

- The biodiversity offset areas as discussed in this report must be formally declared as a Nature Reserve in accordance with Section 23 of NEM:PAA.
- The Environmental Authorisations must only be approved conditionally and should contain suspensive conditions, requiring that, prior to any listed activities being allowed to commence:
 - An agreement must be reached between the applicant, conservation agency (and any other relevant implementing parties), setting out respective rights and responsibilities, and timeframes in which to deliver specific outcomes, with respect to but not limited to:
 - having the area declared as a Nature Reserve (including title deed restrictions and rezoning).
 - identifying, assigning and/or appointing a suitable Management Authority for the Nature Reserve prior to declaration. The management of the Nature Reserve should be assigned to the applicant in terms of Section 38(2) of NEM:PAA. This management agreement must be for a minimum period of 30 years.
 - rehabilitating/restoring and managing the offset site over a 30 year period;
 - implementation roles and responsibilities.
 - penalties for non-compliance with the offset conditions, or breach, and rectification measures.
 - The Public Participation Process for the Provincial Gazetting of the Intention to Declare a Nature Reserve must be completed without any significant opposition.
- The applicant is responsible for all costs associated with declaration of the offset site as a Nature Reserve, and for its management over a 30 year period in accordance with the Management Plan for the Nature Reserve.
- A detailed Management Plan for the offset site must be prepared by a suitably qualified and experienced specialist and submitted to the competent environmental authority. This Management Plan must set out requirements for securing, establishing, rehabilitating/restoring and managing the offset site as a Nature Reserve in terms of Section 23 of NEM:PAA over a 30 year period. This Management Plan must form part of the EMPr for

the proposed developments. It must set out explicit roles and responsibilities for actions that must be taken, clear outcomes to be achieved and timeframes for achieving the outcomes.

The Management Plan must as a minimum include the following:

- Active alien invasive species and bush encroachment clearing measures with annual area- and time bound objectives/targets to be achieved within the overgrazed dense shrubland areas.
- Active re-establishment of *Vachellia erioloba* trees and subsequent nesting habitat restoration measures with annual area- and time bound objectives/targets to be achieved within the overgrazed dense shrubland areas.
- Measures for an increase in the availability of food sources such as the applicant incorporating additional vulture 'restaurants' for monitoring purposes within the offset areas and donating an agreed number of livestock carcasses on an annual basis. Quantities and frequency of carrion to be provided must be set. Carrion provided may however not be contaminated by any agricultural remedies known to be poisonous or detrimental to the health of vultures. It is recommended that a meeting be held with Vulture Research Group in order to agree on the most effective way of addressing this potential mitigation measure and determine the way forward.
- Fire and erosion management measures and objectives.
- The Management Plan conditions should include provisions for the implementation of low impact livestock and/or game rotational grazing activities as a suitable form of ecological management, provided that the stated conservation objectives for the Nature Reserve are achieved and demonstrated through monitoring. This will provide the applicant with a financially viable option for managing the Nature Reserve as well as ensuring that ecological functionality and processes are suitably maintained within the ecosystem.
- No other forms of higher impact land uses or developments must be allowed within the Nature Reserve other than potential establishment of infrastructure associated with essential management of the Nature Reserve.
- A dedicated farm manager should be appointed in order to manage the Nature Reserve in accordance with the Management Plan conditions.
- Provide proof of submission of the application for Nature Reserve status under the NEM:PAA within 12 months of the Environmental Authorisation.
- Monitoring of the effectiveness of Nature Reserve management in terms of the required ecological outcomes must be conducted annually. In particular, monitoring must cover:

- African white-backed vulture presence and nesting/breeding success.
- An independent audit must be carried out one year after the Environmental Authorisation, and every two years thereafter in order to confirm compliance with the conditions of the authorisation and the Management Plan for the offset site. The audits must assess both the ecological performance of the offset site and the adequacy of financial provision, and identify any corrective or adaptive measures which must be taken to ensure that the intended offset outcomes (as stated in the Management Plan) are achieved.

In addition to the above discussed main offset conditions, the following conditions should also be included in the Environmental Authorisation:

- Any trees housing active vulture nesting sites within the proposed development areas must not be removed during the breeding season. Trees should only be cut outside the breeding and fledging period. A suitably qualified and experienced avifaunal specialist must be appointed annually, prior to the commencement of any new vegetation clearance and cultivation activities, in order to ensure that affected nesting sites do not house eggs or young chicks at the specific time of clearance.
- Development of new centre pivot lands and associated tree clearing must be undertaken following a systematic and phased approach, with sequential cutting of trees being incrementally phased at intervals throughout the 7 to 8 year cultivation cycle.

If a suitable offset agreement between the applicant and state conservation authority cannot be reached during the official offset agreement negotiation meeting, the conditional Environmental Authorisations must be withdrawn and the listed activities associated with the proposed developments must not be allowed to commence.

Should the purchase of the offset site (i.e. Nature Reserve) properties be agreed between the applicant and SANParks in future, the management authority would need to be re-assigned.

9. Nature Reserve Declaration Process and Financial Provision

The formal declaration process of the potential biodiversity offset areas as a Nature Reserve in accordance with Section 23 of NEM:PAA, will broadly entail the following steps:

- If a suitable offset agreement is reached during the official offset agreement negotiation meeting between the applicant and state conservation authority, a Consent to Declare is to be signed by the applicant.
- An Intention to Declare the area as a Nature Reserve is then to be gazetted by the MEC in the Provincial Gazette for comment.
- The Gazetting process is to be accompanied by a Public Participation Process (PPP) of minimum 60 days at the cost of the applicant.
 - The PPP will entail formal notification of all Interested and Affected Parties (I&AP' s) and stakeholders. This includes as a minimum all organs of state and None Governmental Organisations (NGO' s) which were associated with the original EIA PPP.
 - It will as a minimum include the Department of Mineral Recourses (DMR), Department of Agriculture Land Reform and Rural Development, Department of Energy, Local and District Municipal Management, Endangered Wildlife Trust (EWT), BirdLife South Africa and World Wildlife Fund South Africa (WWF)
 - The PPP will include advertising of the Intention to Declare in two nationally distributed newspapers.
- Once the Intention to Declare gazetting process and its accompanying PPP has been completed without any significant opposition arising, the MEC is to draft a Management Agreement which is to be agreed upon and signed by both the MEC and applicant.
- The final Declaration of the area as a Nature Reserve is to be signed and gazetted by the MEC in the Provincial Gazette.
- A Management Plan is to be compiled for the Nature Reserve and submitted to the MEC at the cost of the applicant. This Management Plan is to be reviewed on a maximum five year basis and re-submitted to the MEC at the cost of the applicant.
- A conveyance attorney is then to amend and endorse the title deeds of the relevant properties declared as a Nature Reserve at the cost of the applicant.
- Annual monitoring of the Nature Reserve in accordance with the Management Plan performance criteria is to be conducted by the state conservation authority and an annual monitoring report is to be submitted to the MEC.

The following minimum estimated financial provisions will have to be made by the applicant in order to ensure the successful declaration, management and monitoring of the Nature Reserve. These are only estimated figures in order to provide an idea of the minimum basic financial requirements associated with the offset declaration and management processes. A comprehensive financial analysis will need to be done to obtain accurate final figures.

Table 7: Minimum estimated financial provisions for the declaration, management and monitoring of the Nature Reserve

Item	Approximate Cost
Gazetting and PPP associated with the Intention to Declare	± R 115 000 (once off)
Appointment of a quantity surveyor	If the portions north of the Plooyberg road on the Remaining Extent of the Farm Plooy Berg no 95 and Portions 1 & 2 of the Farm Biesjesbult West no 96 are not to be included in the declaration, they will have to be surveyed. Difficult to give an accurate estimate.
Gazetting of final Declaration	± R 15 000 (once off)
Conveyance attorney for amendment/endorsement of title deeds	± R 10 000 (per property)
Appointment of a farm manager	± R 15 000 (annually)
Compilation of Management Plan	± R 50 000 (once off)
Review of Management Plan	± R 15 000 (every five years)
Annual monitoring in accordance with Management Plan	Annual monitoring could be conducted by the state conservation authority or it might be required for the applicant to appoint an independent specialist. ± R 30 000 (annually)
Independent audit every two years	± R 30 000 (every two years)

Annual avifaunal specialist appointed, prior to the commencement of any new vegetation clearance and cultivation activities	± R 20 000 (annually for eight years depending on the completion period for all the centre pivot lands)
Alien invasive species and bush encroachment clearing measures	Difficult to give an accurate estimate. Will be linked to the annual area- and time bound objectives/targets as per the Management Plan.
<i>Vachellia erioloba</i> trees re-establishment and subsequent nesting habitat restoration measures	Difficult to give an accurate estimate. Will be linked to the annual area- and time bound objectives/targets as per the Management Plan.
Fire and erosion management measures	Difficult to give an accurate estimate.
Other Nature Reserve Management requirements in accordance with NEM:PAA	Difficult to give an accurate estimate.
Potential adaptive or corrective management based on monitoring and audit results	Difficult to give an accurate estimate.

10. Summary and Conclusions

It is recommended that Alternative 2 for the Remaining Extent of the Farm Zulani no 167 and Alternative 2 for the Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166 be considered for the proposed developments. These alternatives mainly fall outside the Critical Biodiversity Area two (CBA 2) areas and have relatively small direct impacts. In the case of these Alternatives 2 the proposed developments are unlikely to lead to direct and permanent destruction of irreplaceable or near-irreplaceable biodiversity as no critically endangered bird individuals will be killed, in which case it would have constituted a fatal flaw. The proposed developments will however lead to some loss of CBA 2 area, significant loss of protected tree species as well as the permanent destruction of significant nesting habitat (although not necessarily unique) and subsequent displacement of a number of critically endangered birds. These residual negative impacts need to be remedied in order to satisfy the NEMA principles.

It is the opinion of the specialist that the significance of residual negative impacts of both development alternatives on Portion 1 of the Farm Lorraine no 100 cannot be reduced and mitigated to within acceptable levels. The significant negative impacts associated with transformation of the CBA 2 (Mokala National Park 10 km buffer zone), destruction of nationally protected tree species and habitat for the Critically Endangered African white-backed vulture pose a high risk of loss of irreplaceable biodiversity. Biodiversity offsets in this case would not be able to remedy these significant residual impacts which must therefore be seen as a fatal flaw for this particular proposal.

With regard to the residual negative impacts of the Alternative 2 proposals of the two developments:

- A combined total area of approximately 805 ha of a Least Threatened vegetation type in overall undisturbed, natural condition, comprising approximately 90 ha of CBA 2 habitat and 715 ha of Other Natural Areas (ONA's), would be converted by the proposed developments.
- A combined total of approximately 15 875 individuals of the nationally protected tree species *Vachellia erioloba* & *Vachellia haematoxylon* will have to be removed on the approximately 805 ha.
- A combined total of approximately 1250 ha of broader nesting habitat and foraging grounds including a minimum of 8 active nests of the Critically Endangered African white-backed vulture will be significantly impacted upon by physical clearance of vegetation and compromising of their ecological integrity due to the ecological 'edge effect' caused by surrounding cultivated pivot lands and agricultural activities. This area including a minimum of

8 active nests could constitute an approximate 4.5 % of the greater Kimberley area breeding population and approximately 14.5 % of the specific Mokala colony breeding population.

A 'like for like' approach was followed in determining suitable locations for potential biodiversity offset areas by identifying areas with similar biodiversity pattern and ecological process components as that of the areas being impacted upon by the proposed developments. The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status of candidate offset areas was further followed as far as practicably possible, by identifying potential biodiversity offset areas of greater value or priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments.

The most up to date vulture colony figures and data as per Murn *et. al.*, (2017) were used as a baseline for calculating a potential offset size. In accordance with the calculations, a combined minimum biodiversity offset size of approximately 8987 ha is proposed in order to mitigate the significant long term residual ecological impacts associated with the proposed developments. The potential offset area must however be associated with the Mokala vulture colony and must provide a minimum of approximately 6657 ha of suitable nesting habitat and foraging grounds of the critically endangered Red Data Listed bird species *Gyps africanus* (African white-backed vulture) which must consist of a *Vachcellia erioloba* and/or *V haemataxylon* dominated savannah landscape. It must also preferably be located within a CBA and/or in close proximity to existing formally protected areas.

The most feasible option for securing the biodiversity offset areas is for the applicant to enter into a stewardship agreement with the state conservation authority. It is proposed that the potential biodiversity offset areas be formally declared as a Nature Reserve in accordance with Section 23 of NEM:PAA, with a number of benefits for biodiversity conservation.

A potential biodiversity offset area for the two proposed developments of approximately 12 297 ha was assessed on five farm properties owned by the applicant. These offset areas provide a large continuous portion of open savannah landscape of approximately 7 427 ha in size which is in a natural, relatively pristine condition. The open savannah landscape forms part of the Mokala vulture colony and provides suitable nesting habitat and foraging grounds for the Critically Endangered African white-backed vulture. In excess of 60 individuals and 35 active nests of this species were encountered during the ecological assessment. The open savannah landscape also houses

approximately 148 540 individuals of the nationally protected tree species *Vachellia erioloba*. The offset area is situated directly adjacent north of the Mokala National Park and therefore forms part of the broader nesting habitat and foraging grounds of the Mokala vulture colony.

The remaining portions of the potential biodiversity offset areas constitute either denser woody shrubland- or open karroid shrub- and grassland areas. Although these areas do not provide suitable nesting habitat for the Critically Endangered African white-backed vulture due to the lack of larger *Vachellia spp.* tree individuals, these areas form part of their foraging grounds, thus contributing to the conservation of this species. These areas add significant value to the broader ecosystem and ecological process. A 'like for like' potential biodiversity offset area is therefore evident with similar and even improved biodiversity pattern and ecological process components as that of the areas being impacted upon by the proposed developments.

All of the potential biodiversity offset properties fall within a Critical Biodiversity Area two (CBA 2) associated with the buffer zone surrounding the Mokala National Park to the south. The 'ecosystem' approach and targeting 'offset receiving areas' with regards to provincial conservation status for the potential biodiversity offset areas is therefore evident as the potential biodiversity offset areas are of greater value and priority to biodiversity conservation from a strategic perspective than the areas being impacted upon by the proposed developments.

The availability of carrion however also plays a significant limiting role when it comes to the capacity of vulture breeding pairs which a specific area can accommodate. Provision of suitable nesting habitat through an offset which is already occupied by active breeding pairs, would therefore not necessarily completely atone for the loss of existing nesting habitat and foraging grounds. Additional mitigation measures for improving/re-establishing degraded habitat and increasing carrion availability in areas would also be required to increase the desired success of the potential offset over time.

The active bush encroachment alleviation and management measures being implemented by the applicant within historically overgrazed areas should, in the long term, lead to the improvement of nesting habitat. Active re-establishment of *Vachellia erioloba* trees and subsequent nesting habitat restoration in such overgrazed bush encroached areas must however also be implemented as additional mitigation measures to increase the desired success of the potential offset over time.

An increase in nest density could potentially also be encouraged within the offset area by increasing the availability of food sources such as incorporating additional vulture 'restaurants' for monitoring purposes. Carrion provided may however not be contaminated by any agricultural remedies known to be poisonous or detrimental to the health of vultures. It is however recommended that a meeting be held with Vulture Research Group in order to agree on the most effective way of addressing this potential mitigation measure and determine the way forward.

In the opinion of the specialist, the declaration and management of the identified properties as a Nature Reserve in accordance with the NEM:PAA requirements, satisfy the offset requirement for the proposed two developments and remedy their significant residual ecological impacts. The proposed developments should therefore be considered by the competent authority for environmental authorisation and approval.

If the Environmental Authorisations for the proposed two developments are approved, it is recommended that an official offset agreement negotiation meeting between the applicant and state conservation authority be conducted as soon as practicably possible. The objective of this meeting must be to finalise the offset agreement and obtain the applicant's consent and intent to declare a Nature Reserve in terms of the NEM:PAA. A number of recommendations are made for conditions to be included in the Environmental Authorisation; some of these conditions would be suspensive, depending on requirements being met before any listed activities could commence (see heading 8.4).

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National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014

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12. Appendices

12.1. Appendix 1: NEMA Draft Biodiversity Offset Policy Principles

Discussion of the 14 specific principles which underpin the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy as set out in Section 4.

1. The Ecosystem Approach

Biodiversity offsets take an 'ecosystem approach' to biodiversity conservation which promotes the integrated management of land, water and natural capital to achieve conservation and sustainable use of biodiversity. This approach recognizes the interdependence between biodiversity, ecosystems and the benefits they provide for people through use and cultural values. It takes a landscape-scale, rather than a site-specific scale view, to enable consideration of cumulative impacts.

2. Offsets - the last resort in the Mitigation Sequence

Biodiversity offsets should only be considered as a mitigation option once all feasible actions and alternatives, first to avoid or prevent impacts on important biodiversity, then to minimize impacts, and then to repair or restore areas harmed by impacts to the condition before impact or better, have been taken into account.

3. Limits to what can or should be offset

Biodiversity offsets are to be used in cases where the EIA process identifies negative residual impacts of 'medium' or 'high' significance on biodiversity. Activities resulting in impacts of 'low' significance may not require an offset. Impacts on biodiversity of 'very high' significance may not be able to be fully offset because of the conservation status, irreplaceability, or level of threat to affected biodiversity, or the risk of preventing scientific targets for conserving that biodiversity from being met. In these cases, given that the proposed activity would lead to irreversible impacts and irreplaceable loss of biodiversity, alternatives to the proposal should be sought; i.e. the proposed activity should not be authorized in its current form.

4. Ecosystem protection

Biodiversity offsets should ensure the long-term protection of priority ecosystems on the ground and improve their condition and function, thereby resulting in measurable positive outcomes for biodiversity conservation 'on the ground'. These outcomes could contribute to improved ecosystem integrity and increased use and/or cultural value of offset areas and the ecosystems of which they are part.

5. No Net Loss up to specified limits of acceptable change

Offsets should not be used to 'soften' a development proposal that would result in unacceptable loss of biodiversity. Biodiversity offsets should be designed in such a way that scientific targets for conserving ecosystems and other biodiversity features in the long term are attainable and not undermined as a consequence of the proposed activity. No biodiversity feature (species or ecosystem) should be at risk of being pushed beyond an Endangered threat status by a development.

6. Locating biodiversity offsets in the landscape

Biodiversity offsets should be located in the landscape in such a way that they help to secure priority areas for conservation, improve connectivity between these priority areas, and/or consolidate or expand existing protected areas. Where priority ecosystem services are residually affected, biodiversity offsets should preferably be located in the landscape in such a way that they deliver equivalent services to affected parties; that failing, additional compensation measures would be needed for these parties.

7. Equivalence – 'like for like'

Biodiversity offsets should comprise - or benefit - the same biodiversity components as those components that would be negatively affected by development. In exceptional cases only, and only with support from the provincial conservation agency, could consideration be given to the biodiversity offset targeting a relatively more threatened ecosystem or habitat.

8. Additionality – new action required

Biodiversity offsets must result in conservation gains above and beyond measures that are already required by law or would have occurred had the offset not taken place.

9. Timing and duration of biodiversity offsets

The design of the biodiversity offset and plans for its implementation should be approved by the provincial biodiversity conservation agency and the CEA before the proposed listed activity starts. Implementation of the biodiversity offset should preferably take place before the impacts of the activity occur, or as soon thereafter as reasonable and feasible. The biodiversity offset site(s) should endure at least for the duration of the residual impact on biodiversity, but preferably in perpetuity, in order to make a long-term contribution to biodiversity conservation. It should be monitored and managed adaptively to sustain biodiversity outcomes.

10. Defensibility

The measure of residual negative impacts on biodiversity caused by a proposed development, as well as the design and implementation of biodiversity offsets, should be based on the best available biodiversity information and sound science, and should incorporate local traditional or conventional knowledge as appropriate. Offsets must consider all significant residual impacts on biodiversity: direct, indirect and/ or cumulative impacts. The scope of assessment must include due consideration of impacts on recognized priority areas for biodiversity conservation; impacts on biodiversity pattern (conservation status of ecosystem and species, importance to migratory species) and ecological and evolutionary processes (must look across scales and take into account connectivity, gradients and corridors); and impacts on ecosystems or species on which there is high dependence for health, livelihoods, and/ or wellbeing.

11. Precaution

The biodiversity offset must be designed in a risk-averse and cautious way to take into account uncertainties about the measure of residual negative impacts (including uncertainties about the effectiveness of planned measures to avoid/ prevent, minimize and rehabilitate impacts), and the successful outcome and/ or timing of the biodiversity offset.

12. Fairness and equity

The determination of residual negative impacts, and the design and implementation of biodiversity offsets, should be undertaken in an open and transparent manner, providing for stakeholder engagement, respecting recognised rights, and seeking positive outcomes for affected parties. Biodiversity offsets should not displace negative impacts on biodiversity to other areas, and/ or cause significant negative effects that in turn would need to be remedied.

13. Non substitutable

A biodiversity offset cannot be exchanged for, or traded off against, compensation for social, cultural heritage or other residual impacts unrelated to biodiversity. Moreover, offsets for residual impacts on use or cultural values of biodiversity cannot be exchanged or substituted for offsets on intrinsic values of biodiversity.

14. Enforceable and auditable

Offsets must be able to be monitored and audited in relation to clear management and performance targets. In addition, they must be able to be enforced through explicitly worded, legally binding conditions, and/or common law contracts.

12.2. Appendix 2: NEMA Draft Biodiversity Offset Policy Basic Offset Ratio Guidelines

The following table within the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy provides appropriate basic offset size ratio recommendations/guidelines, based on the particular impacted biodiversity feature. Due to the policy still being amended prior to final promulgation this table only provides a draft size ratio guideline which will still be amendment within the final policy.

Table 8: Table indicating the appropriate basic offset size ratio recommendations/guidelines in accordance with the National Environmental Management Act (Act 107 of 1998): Draft Biodiversity Offset Policy

Feature	Basic offset ratio and specific requirements of the offset	Adjustments to size and/ or number of offsets
Composite biodiversity attributes		
Areas of irreplaceable biodiversity	<u>Impacts on irreplaceable biodiversity to be avoided</u> Offset at 30:1 only where no alternatives to the development project are deemed feasible and where project is of overriding public importance. Refer to the DEA guideline on “Need and Desirability”. Offset sites to comprise areas of highest conservation priority that are currently without protection.	
Areas of composite biodiversity significance recognised in approved biodiversity policy, bioregional, biodiversity or spatial conservation plans	<u>Impacts preferably to be avoided</u> Offset ratio at minimum 20 times the impacted area. Offset sites to comprise areas of highest conservation priority that are currently without protection. Protected areas, CBAs, verified wetland and river feature FEPAs, areas earmarked for protected area expansion.	

Biodiversity pattern		
<p>Ecosystem status (using most up-to-date and reliable biodiversity information, and applying all relevant criteria for listing threat status (e.g. criteria established in GN 1002 see DEA, 2011).</p>	<p>Impacts on Critically Endangered ecosystems should be avoided. Offset at 30:1 only where no alternatives to the listed activity are feasible and where activity is of overriding public importance;</p> <p>Basic offset ratio: Endangered ecosystems at least 10 but up to 20 times impacted area</p> <p>Vulnerable ecosystems from 1 to 5 times impacted area. Least Threatened, then generally no offset required, provided that other criteria do not apply.</p>	<p>Offset sites to comprise areas of highest priority for conservation currently without protection.</p> <p>Offset requirements should be adjusted where necessary on the advice of a biodiversity specialist, to account for the condition of impacted site, and the condition of and ability to restore offset areas.</p>
<p>Species threat status (using most up-to-date and reliable biodiversity information).</p>	<p>Impacts on the habitat of Critically Endangered species and local endemic species with highly restricted distributions should be avoided.</p> <p>When threatened or localised endemic species are impacted, the offset must cater explicitly for the habitat needs of the affected species and prevent any change (i.e. increase) in their threat status. A precautionary approach to</p>	<p>Where the ecosystem is listed as Least Threatened, it may be necessary to provide an offset to cater for residual negative impacts on threatened species.</p> <p>Where an offset requirement has been determined for a threatened ecosystem (i.e. recognised as Vulnerable, Endangered or Critically Endangered) using the basic offset ratio, it may be necessary to increase size of offset and/ or</p>

	determining the size of offset must be exercised in cases where highly threatened or vulnerable species are affected.	number of offset sites on the advice of a relevant biodiversity specialist to ensure enough of that species' habitat would be protected and managed to ensure its status would not change (i.e. worsen).
Biodiversity process		
Important ecological, corridors (e.g. linking mountains to coast, along gradients, linking protected areas or other priority areas for biodiversity) or areas important for ecological functioning.	If any important corridors are impacted, the offset must incorporate areas that would provide substitute corridors or linkages connecting priority areas.	Where the ecosystem is Least Threatened, it may be necessary to provide an offset to cater for residual negative impacts on important biodiversity process areas. Where an offset requirement has been determined for a threatened ecosystem using the basic offset ratio, it may be necessary to provide an offset, and/ or to increase size of offset and/ or number of offset sites on the advice of a relevant biodiversity specialist to ensure that ecological linkages are represented and connectivity maintained.
Ecosystem services		
Areas that provide ecological goods and services of high value to communities or society as a whole, and on which there is a high level of	The offset must provide acceptable substitute goods and services.	Where the ecosystem is Least Threatened, it may be necessary to provide an offset to cater for residual negative impacts on ecosystem services. Where an offset requirement has been determined using the basic offset ratio, it may be necessary to provide

dependence.		additional offset sites that would provide the necessary ecosystem services, and/ or compensation in kind. The potential to rehabilitate degraded parts of earmarked offset areas, to improve ecosystem services delivery to affected communities, should be considered.
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12.3. Appendix 3: Proposed Development Areas Ecology

Detailed discussions of the ecology of the proposed development impact areas.

12.3.1. Alternative 2 of the Remaining Extent of the Farm Zulani no 167

Alternative 2 of the proposed Zulani surface footprint area constitutes 14 centre pivot lands of approximately 45 ha in size each. This equates to a total footprint area of approximately 630 ha.

In accordance with the results from the ecological assessment report, the surface vegetation of the northern development portion associated with Alternative 2, 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.

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 northern development portion amounts to approximately 20 trees/ha which equates to a total estimate of approximately 10 800 trees within the northern development portion which will need to be removed. Shrubs found to be present mostly include *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected).



Figure 17: Image illustrating the landscape of the northern development portion

The surface vegetation of the most southerly situated 2 centre pivot lands associated with Alternative 2, 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) & *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* & *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.



Figure 18: Image illustrating the increased woody density towards the ridge/hills area as well as the presence of the provincially protected species *Boscia albitrunca*

The majority of the most southerly situated centre pivot land associated with Alternative 2 however has a relatively sparse woody component and constitutes gently to moderately sloping open bottomland sparse savannah rather than the higher woody density rocky areas encountered within the centre pivot land directly north. 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 to the south.

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.



Figure 19: Image illustrating the landscape of the open bottomland sparse savannah

The average density of trees within the most southerly situated 2 centre pivot lands associated with Alternative 2, amounts to approximately between 15 trees/ha and 20 trees/ha which equates to a total estimate of approximately 1575 trees within the footprint areas which will need to be removed.

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), 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. No other unique or important habitats for nesting sites were observed.



Figure 20: Image illustrating the presence of active nests of the critically endangered African white-backed vulture (*Gyps africanus*)

The Present Ecological State (PES) of Alternative 2 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 Ecological Importance and Sensitivity (EIS) of Alternative 2 is classified as Class B (high) as it is ecologically important and sensitive on national scale for the persistence of the CBA 2 ecological corridor (only associated with the most southerly situated 2 centre pivot lands) and due to the significant presence of nationally protected tree species and the critically endangered African white-backed vulture. The area is considered to be of high conservation 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. Biodiversity is however still relatively ubiquitous due to the vast and homogenous surrounding landscape.

12.3.2. Alternative 2 of the Remaining Extent of the Farm Banks Drift no 164 & Portion 1 of the Farm Christians Drift no 166 (together)

Alternative 2 of the proposed Banksdrift surface footprint area constitutes 14 centre pivot lands of approximately 25 ha in size each. This equates to a total footprint area of approximately 350 ha.

In accordance with the results from the ecological assessment report, the surface vegetation associated with the centrally situated 7 centre pivot lands within Alternative 2, has been completely transformed due to the presence of two existing large cultivated pivot lands. Areas surrounding the existing pivot lands have been historically rehabilitated and a sufficient grass layer has been re-established which is representative of the grass layer present within the surrounding natural savannah landscape. The grass layer is mainly dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana* & *Aristida spp.* The woody component is however still in the process of re-establishing and is therefore only represented by small, sporadic shrubs of the species *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected) which have encroached into the area (≤ 200). A distinct lack of large single stemmed trees is evident when compared to the surrounding savannah landscape.



Figure 21: Image illustrating the landscape of the historically rehabilitated areas around the existing cultivated pivot lands

The Present Ecological State (PES) of the portion of Alternative 2 associated with the existing cultivated pivot lands is classified as Class D as it is largely modified. A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred due to the transformation through cultivation processes.

The Ecological Importance and Sensitivity (EIS) of the portion of Alternative 2 associated with the existing cultivated pivot lands is classified as Class D (low) as it is not ecologically important and/or sensitive on any scale due to the complete transformation caused by the existing cultivation processes. The existing cultivated pivot lands are therefore not necessarily considered to be of high conservation significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem or broader vegetation type.

The surface vegetation associated with the 7 centre pivot lands situated to the north of the existing cultivated pivot lands within Alternative 2, consists of a 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.

The two dominant tree species present are *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected) which are fairly equally represented in the area. The average density of trees within the footprint area amounts to approximately 20 trees/ha which equates to a total estimate of approximately 3500 trees within the footprint area which will need to be removed. Shrubs found to be present mostly include *Vachellia erioloba* (nationally protected) & *Vachellia haematoxylon* (nationally protected).



Figure 22: Image illustrating the landscape of the development portion to the north of the existing cultivated pivot fields

The soils however become increasingly rockier and loamier towards the northern boundary (R 357 provincial road) due to the presence of a solitary hill outside the footprint area associated with the Vaalbos Rocky Shrubland vegetation type (SVk 5). Due to this variation in soil conditions from the dominant deep sandy red soils, the density of the woody component increases significantly within this most northerly portion. Although single stemmed trees such as *Vachellia erioloba* (nationally protected) & *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* & *Grewia flava*.



Figure 23: Image illustrating the increased woody density towards the northern boundary

Although the proposed Banksdrift 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 woody component of the area has the potential to house active nests of the African white-backed vulture (*Gyps africanus*), which is a critically endangered Red Data Listed species, species. No nests were specifically observed but the larger area provides suitable and important nesting habitat and foraging grounds. The separate Avifaunal Impact Assessment conducted for the proposed project, also reaffirmed this. Numerous large congregated nests of sociable weavers (*Philetairus socius*) (provincially protected) are also scattered throughout the footprint area. No other unique or important habitats for nesting sites were observed.

The Present Ecological State (PES) of the portion situated to the north of the existing cultivated pivot lands within Alternative 2 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 cultivated pivot lands, the R 357 provincial road and anthropogenic farm management practises but the ecosystem functionality has remained essentially unchanged.

The Ecological Importance and Sensitivity (EIS) of the portion situated to the north of the existing cultivated pivot lands within Alternative 2 is 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 habitat. The area is considered to be of high conservation significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and protected/Red Data Listed species.

12.4. Appendix 4: Details of the Specialist

Adriaan Johannes Hendrikus Lamprecht (Pr.Sci.Nat)

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

South African Council for Natural Scientific Professions (SACNASP): Professional Ecological Scientist
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Email Address: ajhlamprecht@gmail.com

Abbreviated Curriculum Vitae

Qualifications

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

Accredited courses completed

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

Professional registrations

- South African Council for Natural Scientific Professions (**SACNASP**)
 - Professional Ecological Scientist Registration number 115601
- International Association for Impact Assessment (**IAIA**)
 - Registration number 5232
- South African Green Industries Council (**SAGIC**) Invasive Species training
 - Registration number 2405/2459

Employment and Experience Background

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

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

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

rehabilitation support to mining clients, with regards to sufficient soil preparation and amelioration, grassing processes, as well as grass species mixtures and ratios.

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

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

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

Ecological Specialist Report Completion

2018

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

- Completion of a specialist Grazing and Erosion Management Plan for the Retiefs Nek no 123, outside Bethlehem, Free State Province.
- Completion of a specialist Grazing and Erosion Management Plan for the Dekselfontein no 317, outside Bethlehem, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 12 ha agricultural development project in Petrusville, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 270 ha industrial park development project in Secunda, Mpumalanga Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 233 ha industrial park development project in Sabie, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for the proposed Dawid Kruiper Local Municipality Residential Development around Upington, Northern Cape Province.
- Completion of two specialist ecological assessments and reports for two proposed 15 ha agricultural development projects outside Hopetown, Northern Cape Province.
- Completion of two Alien Invasive Species Management Plans for two proposed 15 ha agricultural development projects outside Hopetown, Northern Cape Province.
- Completion of a Protected Species Relocation Management Plan for a proposed 15 ha agricultural development project outside Hopetown, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 169 ha industrial park development project in Sabie, Mpumalanga Province.
- Completion of a specialist Grazing and Erosion Management Plan for the Farm Barnea no 231, outside Bethlehem, Free State Province.
- Compilation of a GIS locality, vegetation and sensitivity map for the proposed 7.13 ha Karoo Hoogland Local Municipality Residential Development project in Sutherland, Northern Cape Province.
- Completion of a specialist Erosion and Rehabilitation Monitoring Report for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Drafting of an official Environmental Policy for Teambo Facilitators (Pty) Ltd in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 11.6 ha COGHSTA NEMA Section 24G residential development project in Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 3.26 ha COGHSTA NEMA Section 24G residential development project in Strydenburg, Northern Cape Province.

- Completion of a specialist ecological assessment and report for a proposed 25.6 ha COGHSTA NEMA Section 24G residential development project in Loxton, Northern Cape Province.

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 and report 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.
- 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 Invasive Species Management Plan for the Farm Smaldeel no 15032 outside Paul Roux, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 16.4 ha Truckstop and Filling Station development project in Senekal, Free State Province.

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- Completion of a specialist ecological assessment and report for the proposed 3 km Olifantshoek Bulk Water Supply and reservoir development project in Olifantshoek, Northern Cape Province.

- Completion of two specialist ecological and wetland assessments and reports for the proposed respective 16 ha and 6 ha N8 highway gravel quarries development project near Ladybrand, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 100 ha De Eelt vineyard development project near Prieska, Northern Cape Province.
- Completion of two specialist ecological and wetland assessments and reports for the Lafarge cement production facility and quarry, respectively near Lichtenburg, North-West Province.
- Completion of a specialist ecological assessment and report for the proposed 12 ha Nooitgedacht Retirement Estate development project near Nelspruit, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for the proposed 42 km Ventersburg Bulk Water Supply and reservoir development project between Ventersburg and Riebeeckstad, Free State Province.