

Ecological Impact Assessment Report

**Farm Donegal no 217 Agricultural
Development, Hopetown, Northern**

Cape Province

April 2018

Compiled for:

Olyf Trust

Compiled by:

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Table of Content

1.	Introduction.....	1
2.	Date and Season of Ecological Walkthrough/Site Assessment	2
3.	Assessment Rational	3
4.	Objectives of the Assessment	4
5.	Methodology	5
6.	Study Area	11
6.1.	Climate.....	13
6.2.	Geology and Soils	13
6.3.	Vegetation and Conservation Status	13
7.	Assumptions, Uncertainties and Gaps in Knowledge	16
8.	Results and Discussion	18
8.1.	Current Existing Vegetation and Site Condition.....	18
8.2.	Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS).....	20
8.3.	Species List for the Assessment Area	21
9.	Ecological Impact Assessment	22
9.1.	Construction Phase.....	22
9.2.	Operational Phase	26
9.3.	Cumulative Impacts.....	29
9.4.	Risk Ratings of Potential Impacts	30
9.4.1.	Construction Phase.....	31
9.4.2.	Operational Phase	38
10.	Conclusion	46
11.	References	48

Executive Summary

The project applicant, Olyf Trust proposes to develop a natural portion of virgin soil into an approximate 15 ha cultivated pivot land on the Remaining Extent of the Farm Donegal no 217. The purpose of the cultivation will either be for commercial organic planting, harvesting of pumpkins for export purposes or for planting of grazing pastures. The final crops to be planted will be dependent on the results of the soil suitability assessment. Irrigation water will be obtained from four existing boreholes located directly adjacent north-west of the assessment area.

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

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

EcoFocus Consulting was therefore subsequently appointed by the applicant as the independent ecological specialist to conduct the required Ecological study for the proposed project. This report constitutes the Ecological Impact Assessment. A site visit/assessment for the proposed development footprint area was conducted on 27 March 2018. This date forms part of the end of the growing season and most plant species present could therefore be successfully identified.

Methodology

The proposed assessment area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present. Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the 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.

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

Study Area

The assessment area consists of two alternative footprint areas. Alternative 1 (preferred) is approximately 15 ha in size and Alternative 2 is approximately 5 ha in size. Both alternatives are situated on the Remaining Extent of the Farm Donegal no 217 (SG 21 Digit Code: C0320000000021700000). The farm is situated approximately 17 km north of the town of Hopetown. The farm forms part of the Siyancuma Local Municipality which in turn, forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. Access to the assessment area is obtained via the R 385 provincial road and subsequent dirt road from the south.

According to Mucina & Rutherford (2006), the entire assessment area falls within the Northern Upper Karoo vegetation type (NKu 3) which mainly consists of flat to slightly sloping shrubland, dominated by dwarf karoo shrubs and sparse grasses. This vegetation type is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006).

The entire assessment area is merely categorised as other natural land in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

Results and Conclusion

The mechanical clearance and soil preparation associated with the proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

Although the assessment area is in a pristine undisturbed natural state and scored a high PES value, the Northern Upper Karoo vegetation type (NKu 3) associated with the area is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006). The surrounding natural area associated with the relevant vegetation type, is extremely vast and homogenous and largely undeveloped. The entire assessment area is also merely categorised as other natural land in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

No Red Data Listed, provincially- or nationally protected or any other species of conservational significance were found to be present within the assessment area. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted. The assessment area does not fall within an Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map), and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the assessment area for breeding or persistence purposes. A small isolated clump of small mammal burrows is present within the assessment area. The mobility of such animals along with the vast, continuous, undeveloped surrounding natural landscape however allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.

Due to the flat topography of the assessment area and surrounding landscape, there are no watercourses or any drainage lines within the immediate vicinity of the assessment area.

The assessment area scored a low EIS value because the biodiversity is ubiquitous and not unique due to the extremely vast and homogenous and largely undeveloped surrounding natural landscape. The assessment area is therefore not viewed as being of high conservational significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type or surface water catchment and drainage area.

It is in the opinion of the specialist that there are no potentially significant ecological impacts associated with the proposed agricultural development. All identified potential ecological impacts can be suitably reduced and mitigated to within acceptable levels. Although Alternative 1 (preferred) scored slightly higher risk ratings than Alternative 2, the difference in ecological impact is not deemed significant due to the small relative increase in transformed footprint. Either of the alternatives can therefore be considered by the competent authority for environmental authorisation and approval.

The proposed development may however only continue if all recommended mitigations measures as per this ecological report are adequately implemented and managed for both the construction and

operational phases of the proposed project. All necessary authorisations and permits must also be obtained prior to any commencement.

List of Figures

Figure 1: Locality map illustrating the assessment area (see A3 sized map in the Appendices).....	12
Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area (see A3 sized map in the Appendices).....	14
Figure 3: Sensitivity map illustrating the conservation status associated with the assessment area (see A3 sized map in the Appendices)	15
Figure 4: Two images illustrating the undisturbed natural landscape of the assessment area	19

List of Tables

Table 1: Criteria for PES calculations	6
Table 2: Criteria for EIS calculations	7
Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings.....	7
Table 4: Scale used for the evaluation of the Environmental Significance Ratings	9
Table 5: Species list for the assessment area (Declared invasive species highlighted in pink)	21
Table 9: Environmental Risk and Significance Ratings.....	31
Table 10: Environmental Risk and Significance Ratings.....	38

Abbreviations

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMA	National Environmental Management Act (Act 107 of 1998)
NFA	National Forests Act (Act 84 of 1998)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
SDF	Spatial Development Framework
WULA	Water Use License Application

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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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.

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.

2016

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

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

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 applicant, Olyf Trust, 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, Olyf Trust proposes to develop a natural portion of virgin soil into an approximate 15 ha cultivated pivot land on the Remaining Extent of the Farm Donegal no 217. The farm is situated approximately 17 km north of the town of Hopetown, Northern Cape Province. The purpose of the cultivation will either be for commercial organic planting, harvesting of pumpkins for export purposes or for planting of grazing pastures. The final crops to be planted will be dependent on the results of the soil suitability assessment. Irrigation water will be obtained from four existing boreholes located directly adjacent north-west of the assessment area.

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

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

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

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

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

2. Date and Season of Ecological Walkthrough/Site Assessment

A site visit/assessment for the proposed development footprint area was conducted on 27 March 2018. This date forms part of the end of the growing season and most plant species present could therefore be successfully identified.

3. Assessment Rational

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

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

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

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

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

4. Objectives of the Assessment

Ecological and habitat survey:

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

5. Methodology

- The proposed assessment area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present.
- Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the 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 **Present Ecological State (PES)** of the proposed project area was assessed and rated as per the table below.

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

Table 1: Criteria for PES calculations

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

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

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

Table 2: Criteria for EIS calculations

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

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

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

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

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

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

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

The maximum Significance Score value is 150.

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

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

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

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

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

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

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

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

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

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

6. Study Area

The assessment area consists of two alternative footprint areas. Alternative 1 (preferred) is approximately 15 ha in size and Alternative 2 is approximately 5 ha in size. Both alternatives are situated on the Remaining Extent of the Farm Donegal no 217 (SG 21 Digit Code: C0320000000021700000). The farm is situated approximately 17 km north of the town of Hopetown. The farm forms part of the Siyancuma Local Municipality which in turn, forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. Access to the assessment area is obtained via the R 385 provincial road and subsequent dirt road from the south.

See locality map below.

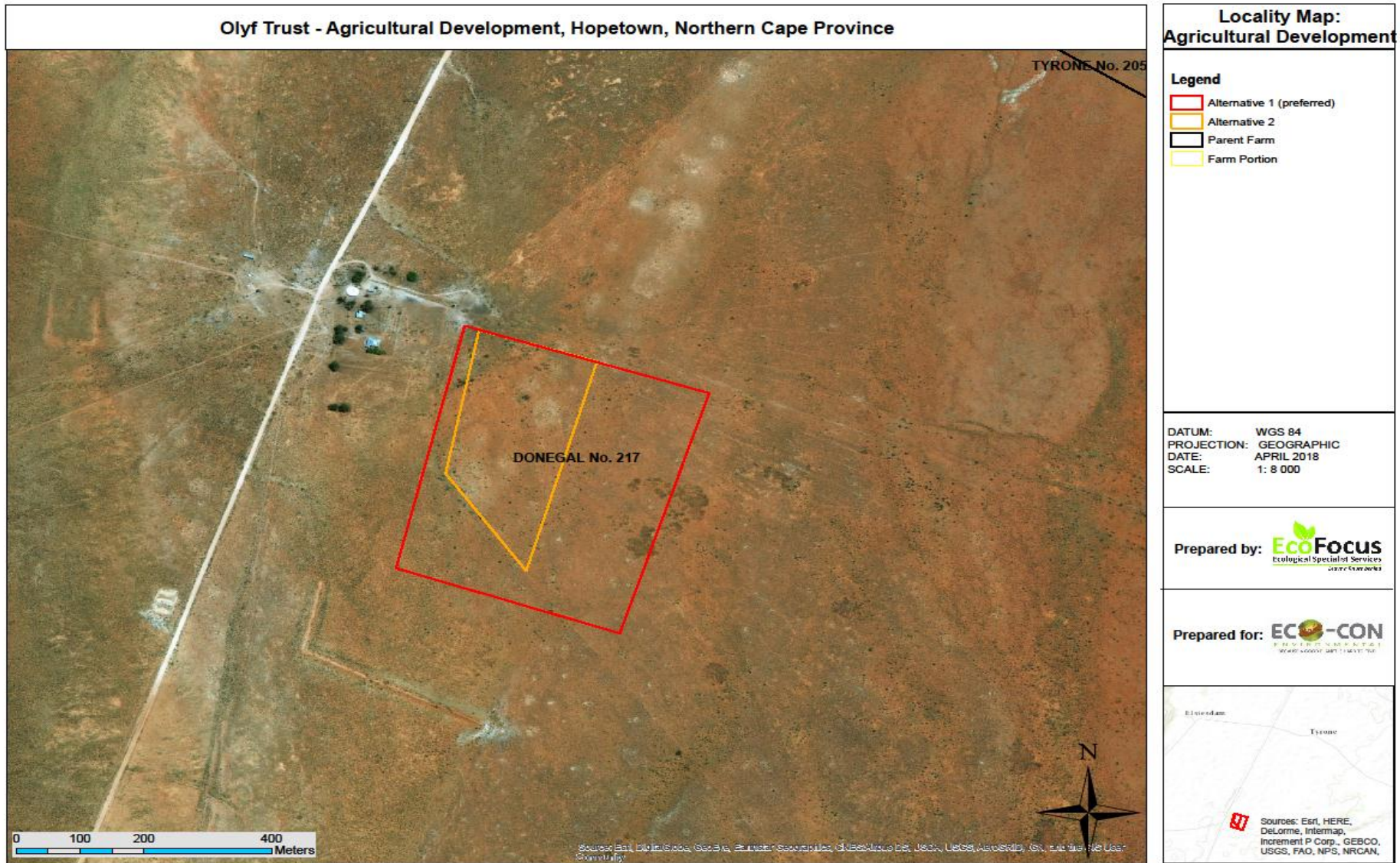


Figure 1: Locality map illustrating the assessment area (see A3 sized map in the Appendices)

6.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 322 mm (www.climate-data.org). The average monthly temperature is approximately 25.5°C in the summer months and approximately 9°C during the winter. Average maximum monthly temperatures can reach up to 33.2°C in the summer months and dip to as low as 0.5°C during the winter.

6.2. Geology and Soils

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

The underlying geology is mainly formed by shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both of the Ecca Group) as well as Dwyka Group diamictites. Broad areas are covered by superficial deposits including calcretes of the Kalahari Group. Soils are variable from shallow to deep, red-yellow apedal and freely draining with potential scattered rocky dolerite outcrops.

6.3. Vegetation and Conservation Status

According to Mucina & Rutherford (2006), the entire assessment area falls within the Northern Upper Karoo vegetation type (NKu 3) which mainly consists of flat to slightly sloping shrubland, dominated by dwarf karoo shrubs and sparse grasses. This vegetation type is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006).

The entire assessment area is merely categorised as other natural land in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

The mechanical clearance and soil preparation associated with the proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

See vegetation and sensitivity maps below.

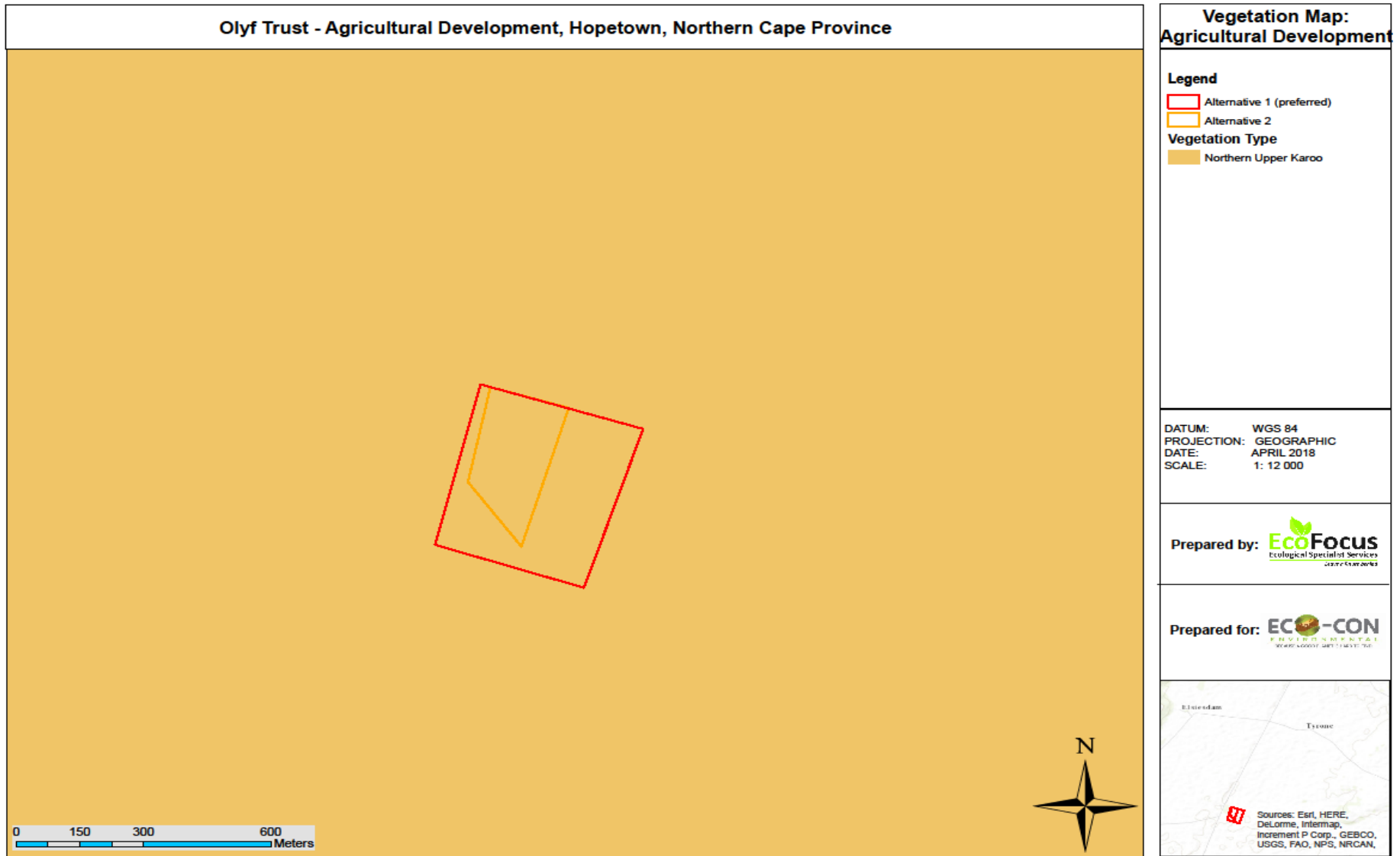


Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area (see A3 sized map in the Appendices)

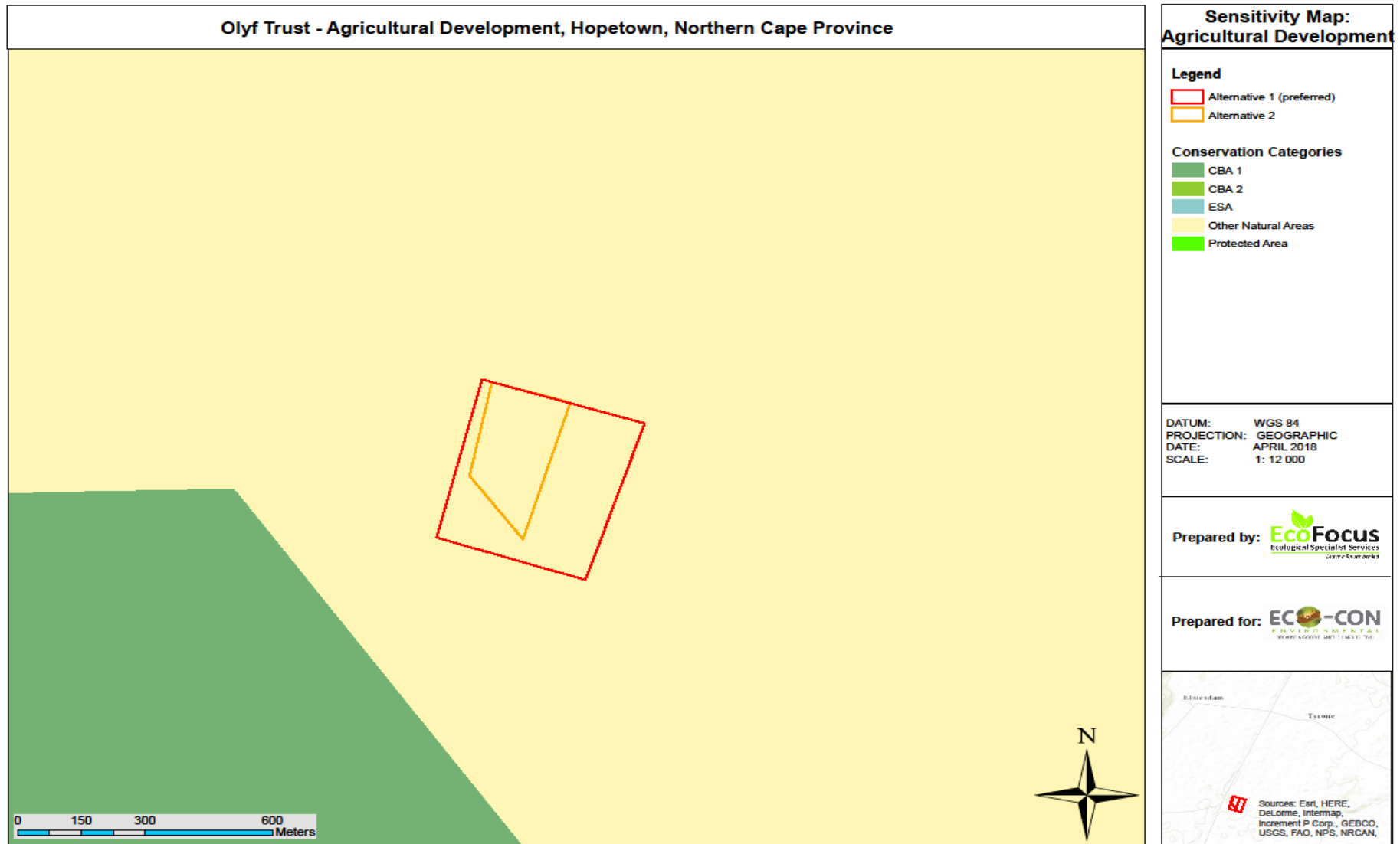


Figure 3: Sensitivity map illustrating the conservation status associated with the assessment area (see A3 sized map in the Appendices)

7. Assumptions, Uncertainties and Gaps in Knowledge

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

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

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

- Uncertainty of prediction is critical at the data collection phase as observations and conclusions are made, only based on professional specialist opinion. Final certainty will only

be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.

- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the BA process. Continual two way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.
- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed development and the subsequent public reaction/opinion which will be received during the Public Participation Process (PPP).
- The agricultural suitability of the soils within the assessment area is unknown. A soil suitability assessment is however being conducted by a suitably qualified and experienced specialist in order to determine this.

Gaps in knowledge can be attributed to:

- The ecological study process was undertaken prior to the availing of certain information which would only be derived from the final project design and layout. The design layout had not been finalised yet at the time of the ecological study.
- The potential of future similar developments in the same geographical area, which could lead to cumulative impacts cannot be meaningfully anticipated.

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

8. Results and Discussion

8.1. Current Existing Vegetation and Site Condition

The assessment area constitutes a flat karroid shrubland with a well-developed low growing grass layer associated with the relevant Northern Upper Karoo vegetation type (NKu 3). The area is in a pristine undisturbed natural state and the surrounding natural area associated with the relevant vegetation type, is extremely vast and homogenous and largely undeveloped.

The karroid shrub layer is mainly dominated by the species *Phaeoptilum spinosum*, *Monechma incanum* & *Pentzia globosa*. Other shrub species also found to be present and well represented include *Crotolaria orientalis*, *Zygophyllum retrofracta*, *Lycium pumilum*, *Salsola aphylla* & *Lycium pillifolium*. A small isolated clump of the shrub species *Rigozum trichotomum* is also present in the northern portion of the assessment area. Small woody shrub individuals of the species *Vachellia tortilis* & *Senegalia mellifera* are sparsely spread throughout the assessment area while a small isolated linear clump of the legally declared invasive species *Agave sp.* (Category 2) is also present. A single small tree individual of the species *Searsia lancea* is also associated with this linear clump.

The well-developed low growing grass layer is mainly dominated by the species *Eragrostis lehmanniana*, *Aristida congesta* & *Stipagrostis obtusa*. Other grass species also found to be present and well represented include *Enneapogon cenchroides*, *Schmidtia pappophoroides*, *Aristida adscensionis*, *Eragrostis obtusa* & *Enneapogon desvauxii*. The forb layer mainly constitutes the species *Thesium hystrix*, *Senna italica subsp arachoides*, *Blepharis mitrada* & *Drimia sp.*

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

The assessment area does not fall within an Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important-bird-areas/iba-map), and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the assessment area for breeding or persistence purposes. A small isolated clump

of small mammal burrows is present within the assessment area. The mobility of such animals along with the vast, continuous, undeveloped surrounding natural landscape however allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.

Due to the flat topography of the assessment area and surrounding landscape, there are no watercourses or any drainage lines within the immediate vicinity of the assessment area.



Figure 4: Two images illustrating the undisturbed natural landscape of the assessment area

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

The Present Ecological State (PES) of the assessment area is classified as Class A as it is unmodified, natural and pristine.

The Northern Upper Karoo vegetation type (NKu 3) associated with the assessment area is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006). The entire assessment area is also merely categorised as other natural land in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

No Red Data Listed, provincially- or nationally protected or any other species of conservational significance were found to be present within the assessment area. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted. The assessment area does not fall within an Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map), and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the assessment area for breeding or persistence purposes. A small isolated clump of small mammal burrows is present within the assessment area. The mobility of such animals along with the vast, continuous, undeveloped surrounding natural landscape however allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas

The Ecological Importance and Sensitivity (EIS) of the assessment area is therefore classified as Class D (low) as it not ecologically important and/or sensitive on any scale. Biodiversity is ubiquitous and not unique due to the extremely vast and homogenous and largely undeveloped surrounding natural landscape. The assessment area is not viewed as being of high conservational significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type or surface water catchment and drainage area.

8.3. Species List for the Assessment Area

Table 5: Species list for the assessment area (Declared invasive species highlighted in pink)

Graminoids	Forbs	Shrubs & trees
<i>Aristida adscensionis</i>	<i>Blepharis mitrada</i>	<i>Agave sp.</i>
<i>Aristida congesta</i>	<i>Drimia sp.</i>	<i>Crotolaria orientalis</i>
<i>Enneapogon cenchroides</i>	<i>Senna italica subsp arachoides</i>	<i>Lycium pillifolium</i>
<i>Enneapogon desvauxii</i>	<i>Thesium hystrix</i>	<i>Lycium pumilum</i>
<i>Eragrostis lehmanniana</i>	-	<i>Monechma incanum</i>
<i>Eragrostis obtusa</i>	-	<i>Pentzia globosa</i>
<i>Schmidtia pappophoroides</i>	-	<i>Phaeoptilum spinosum</i>
<i>Stipagrostis obtusa</i>	-	<i>Rigozum trichotomum</i>
-	-	<i>Salsola aphylla</i>
-	-	<i>Searsia lancea</i>
-	-	<i>Senegalia mellifera</i>
-	-	<i>Vachellia tortilis</i>
-	-	<i>Zygophyllum retrofracta</i>

9. Ecological Impact Assessment

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

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

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

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

9.1. Construction Phase

Transformation of terrestrial vegetation on the assessment area associated with the Northern Upper Karoo vegetation type (NKu 3)

The mechanical clearance and soil preparation associated with the proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

Although the assessment area is in a pristine undisturbed natural state and scored a high PES value, the Northern Upper Karoo vegetation type (NKu 3) associated with the area is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006). The surrounding natural area associated with the relevant vegetation type, is extremely vast and homogenous and largely undeveloped. The size of the proposed development is also minute relative to the surrounding natural land. The significance of this potential impact will be medium.

Mitigation measures to reduce potential impacts:

- The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.
- No site construction camp to be established within the natural surrounding areas outside the proposed development footprint. Site construction camps only to be established within the proposed development footprint or directly adjacently situated historic residential property.
- Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the natural surrounding areas outside the cordoned off area.
- Existing roads and dirt tracks in close proximity to the proposed project area must be used during construction. No new roads or dirt tracks to be constructed or implemented within the natural surrounding areas outside the cordoned off construction area.

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

The mechanical clearance and soil preparation associated with the proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

No Red Data Listed, provincially- or nationally protected or any other species of conservational significance were found to be present within the assessment area. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted. The assessment area does not fall within an Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map), and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the assessment area for breeding or persistence purposes. The significance of this potential impact will therefore be zero.

Terrestrial alien invasive species establishment

Merely a small isolated linear clump of the legally declared invasive species *Agave sp.* (Category 2) is present within the assessment area. These individuals will in fact be removed during the construction phase which will prove to be beneficial to the environment. The assessment area and surrounding areas could however potentially be prone to significant alien invasive species establishment due to surface disturbances caused by construction activities. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Alien invasive species individuals currently on site must be actively eradicated from the assessment area and adequately disposed of in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014.
- Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the construction phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.
- Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant alien invasive species establishment.
- No site construction camp to be established within the natural surrounding areas outside the proposed development footprint. Site construction camps only to be established within the proposed development footprint or directly adjacently situated historic residential property.
- Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the natural surrounding areas outside the cordoned off area.
- Existing roads and dirt tracks in close proximity to the proposed project area must be used during construction. No new roads or dirt tracks to be constructed or implemented within the natural surrounding areas outside the cordoned off construction area.

Surface material erosion

The assessment area and surrounding areas could potentially be prone to surface soil erosion due to the loosening of materials and clearance of vegetation caused by construction activities which usually binds surface material. The assessment area and surrounding landscape however constitutes a flat landscape and the potential for significant erosion is therefore very low. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Adequate storm water and erosion management measures must be implemented for the entire assessment area during the construction phase. This must be done to sufficiently manage storm water runoff in order to prevent any significant erosion from occurring.
- Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant erosion.

Dust generation and emissions

The initial soil preparation and cultivation activities associated with the proposed project construction phase could potentially result in significant fugitive dust emissions due to vegetation clearance and movement of machinery and equipment. Generated dust could spread into- and contaminate the surrounding natural areas. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Implement suitable dust management and prevention measures during the construction phase.
- Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant dust emissions.

9.2. Operational Phase

Once the construction phase has been completed, there should be no significant additional or new ecological impacts associated with the operational phase over and above the already discussed long term impacts of the operational phase. No potentially significant ecological impacts were identified for the construction phase and all identified impacts can be suitably mitigated and reduced to within acceptable levels.

A number of identified potential ecological impacts could however change in nature and increase in significance from the construction phase into the operational phase and will continue throughout the entire lifespan and operational phase of the proposed project.

The following additional potential ecological impacts could also take place during the operational phase of the agricultural development:

Continued terrestrial alien invasive species establishment

The assessment area and surrounding areas could potentially be prone to significant continued alien invasive species establishment due to due to continual disturbances caused by soil preparation and cultivation activities. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the operational phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.

Continued surface material erosion

The assessment area and surrounding areas could potentially be prone to continued surface soil erosion during the operational phase due to the loosening of materials and lack of vegetation caused by continued soil preparation and cultivation activities. The assessment area and surrounding landscape however constitutes a flat landscape and the potential for significant erosion is therefore very low. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Adequate storm water and erosion management measures must be implemented for the entire assessment area during the operational phase. This must be done to sufficiently manage storm water runoff in order to prevent any significant erosion from occurring.

Continued dust generation and emissions

Continued soil preparation and cultivation activities associated with the proposed project operational phase could potentially result in significant continual fugitive dust emissions during the cultivation season. Generated dust could spread into- and contaminate the surrounding natural areas. The significance of this potential impact will be low.

Mitigation measures to reduce potential impacts:

- Implement suitable dust management and prevention measures during the cultivation season.
 - Lands to be sufficiently irrigated prior to commencement of cultivation and planting activities in order to prevent significant fugitive dust emissions.

Alteration/contamination of soil and groundwater characteristics/quality

Operation of the cultivated land could include significant continual irrigation, chemical and organic fertilisation as well as herbicide/pesticide treatment. This continued irrigation, fertilisation and herbicide/pesticide treatment over time will result in significant long term leaching of salts, chemicals and other inorganic elements into the soil and groundwater. This will potentially alter and negatively affect the soil characteristics as well as quality/characteristics of groundwater over time. This will constitute a long term effect which will gradually commence during the operational phase and will continue for the entire duration of the proposed project lifespan and significantly beyond. The proposed development will however constitute organic cultivation for export purposes and no chemical fertilisers or herbicide/pesticide treatment will therefore be administered. The significance of this potential impact will be medium.

Mitigation measures to reduce potential impacts:

- Irrigation and fertilisation practices must be adequately managed in order to prevent over-fertilisation or over-irrigation which could lead to significant leaching and contamination of groundwater. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.

- Samples of the borehole water to be used for irrigation purposes must be chemically and biologically analysed by an accredited laboratory prior to commencement of the operational phase in order to ensure that the water quality is suitable for irrigation use and meets legal discharge quality standards.

Over extraction of groundwater

Significant quantities of groundwater will be extracted for irrigation purposes. In accordance with the information received from the EAP, the proposed development will require approximately 150 000 litres per month in order to irrigate adequately. The water will be sourced from four existing boreholes directly adjacent to the site. This could potentially lead to over extraction and drying up of the aquifer if not adequately managed. The significance of this potential impact will be medium.

Mitigation measures to reduce potential impacts:

- A geo-hydrological study of the four boreholes must be conducted in order to determine their capacity for adequate delivery of the required irrigation water and to determine the potential impact of the extraction on the aquifer.
- Irrigation practices must be adequately managed in order to prevent over-irrigation. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.
- Only the allotted water quantities as per the approved Water Use License are to be extracted.
 - If a valid Water Use License is however not in place, this must firstly be applied for and obtained prior to the commencement of the operational phase.
- A flow meter is to be installed in order to be able to monitor and manage water consumption.
- Water consumption figures must be submitted to the Department of Water and Sanitation (DWS) on a regular basis in order to ensure compliance with the allotted water quantities as per the approved Water Use License.

9.3. Cumulative Impacts

Virtually no other existing agricultural developments and transformation is present within the broader area. It is therefore not anticipated that the proposed development will pose any significant increase in potential cumulative negative ecological impacts associated with agricultural developments. The adequate implementation of the recommended mitigation measures as per this ecological report will be able to suitably reduce the significance of potential cumulative ecological impacts to within acceptable levels.

9.4. Risk Ratings of Potential Impacts

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

9.4.1. Construction Phase

Table 6: Environmental Risk and Significance Ratings

	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Transformation of terrestrial vegetation on the assessment area associated with the Northern Upper Karoo vegetation type (NKu 3)	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	Low (4)	Low (4)
Probability of Impact Occurrence	High (4)	High (4)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Medium (64)	Medium (56)

<p style="text-align: center;">Mitigation Measures to be implemented</p>	<p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>No site construction camp to be established within the natural surrounding areas outside the proposed development footprint. Site construction camps only to be established within the proposed development footprint or directly adjacently situated historic residential property.</p> <p>Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the natural surrounding areas outside the cordoned off area.</p> <p>Existing roads and dirt tracks in close proximity to the proposed project area must be used during construction. No new roads or dirt tracks to be constructed or implemented within the natural surrounding areas outside the cordoned off construction area.</p>	
<p style="text-align: center;">Cumulative Impact Rating after mitigation implementation</p>	<p>Low</p>	<p>Low</p>
<p style="text-align: center;">Environmental Significance Score and Rating after mitigation implementation</p>	<p>Low (39)</p>	<p>Low (39)</p>

	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Terrestrial alien invasive species establishment	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Short term (2)	Short term (2)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (36)	Low (30)
Mitigation Measures to be implemented	Alien invasive species individuals currently on site must be actively eradicated from the assessment area and adequately disposed of in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014.	

	<p>Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the construction phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant alien invasive species establishment.</p> <p>No site construction camp to be established within the natural surrounding areas outside the proposed development footprint. Site construction camps only to be established within the proposed development footprint or directly adjacently situated historic residential property.</p> <p>Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the natural surrounding areas outside the cordoned off area.</p> <p>Existing roads and dirt tracks in close proximity to the proposed project area must be used during construction. No new roads or dirt tracks to be constructed or implemented within the natural surrounding areas outside the cordoned off construction area.</p>	
<p>Cumulative Impact Rating after mitigation implementation</p>	<p>Low</p>	<p>Low</p>

Environmental Significance Score and Rating after mitigation implementation	Low (18)	Low (18)
	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Surface material erosion	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Short term (2)	Short term (2)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low

Environmental Significance Score and Rating prior to mitigation	Low (36)	Low (30)
Mitigation Measures to be implemented	<p>Adequate storm water and erosion management measures must be implemented for the entire assessment area during the construction phase. This must be done to sufficiently manage storm water runoff in order to prevent any significant erosion from occurring.</p> <p>Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant erosion.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (9)	Low (9)
	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Dust generation and emissions	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Short term (2)	Short term (2)

Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (36)	Low (30)
Mitigation Measures to be implemented	<p>Implement suitable dust management and prevention measures during the construction phase.</p> <p>Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant dust emissions.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (9)	Low (9)

9.4.2. Operational Phase

Table 7: Environmental Risk and Significance Ratings

	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Continued terrestrial alien invasive species establishment	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (39)	Low (33)

Mitigation Measures to be implemented	Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the operational phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (20)	Low (20)
	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Continued surface material erosion	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)

Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (39)	Low (33)
Mitigation Measures to be implemented	Adequate storm water and erosion management measures must be implemented for the entire assessment area during the operational phase. This must be done to sufficiently manage storm water runoff in order to prevent any significant erosion from occurring.	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (10)	Low (10)
	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Continued dust generation and emissions	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)

Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Low (2)	Low (2)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (39)	Low (33)
Mitigation Measures to be implemented	<p>Implement suitable dust management and prevention measures during the cultivation season.</p> <p>Lands to be sufficiently irrigated prior to commencement of cultivation and planting activities in order to prevent significant fugitive dust emissions.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (10)	Low (10)

	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Alteration/contamination of soil and groundwater characteristics/quality	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)
Extent of Positive or Negative Impact	Regional (3)	Regional (3)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)
Reversibility of Impact	Low (4)	Low (4)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Medium (54)	Low (48)
Mitigation Measures to be implemented	Irrigation and fertilisation practices must be adequately managed in order to prevent over-fertilisation or over-irrigation which could lead to significant leaching and contamination of groundwater. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.	

	Samples of the borehole water to be used for irrigation purposes must be chemically and biologically analysed by an accredited laboratory prior to commencement of the operational phase in order to ensure that the water quality is suitable for irrigation use and meets legal discharge quality standards.	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (32)	Low (32)
	Alternative 1 (preferred)	Alternative 2
Identified Environmental Impact	Over extraction of groundwater	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Regional (3)	Regional (3)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)

Reversibility of Impact	Low (4)	Low (4)
Probability of Impact Occurrence	High (4)	High (4)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Medium (68)	Medium (60)
Mitigation Measures to be implemented	<p>A geo-hydrological study of the four boreholes must be conducted in order to determine their capacity for adequate delivery of the required irrigation water and to determine the potential impact of the extraction on the aquifer.</p> <p>Irrigation practices must be adequately managed in order to prevent over-irrigation. A suitably qualified and experienced specialist must be consulted in order to advise on appropriate management practices.</p> <p>Only the allotted water quantities as per the approved Water Use License are to be extracted.</p> <p style="padding-left: 40px;">If a valid Water Use License is however not in place, this must firstly be applied for and obtained prior to the commencement of the operational phase.</p> <p>A flow meter is to be installed in order to be able to monitor and manage water consumption.</p> <p>Water consumption figures must be submitted to the Department of Water and Sanitation (DWS) on a regular basis in order to ensure compliance with the allotted water quantities as per the approved Water Use License.</p>	

Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (30)	Low (30)

10. Conclusion

The mechanical clearance and soil preparation associated with the proposed agricultural development will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

Although the assessment area is in a pristine undisturbed natural state and scored a high PES value, the Northern Upper Karoo vegetation type (NKu 3) associated with the area is merely classified as least threatened as very little has been transformed thus far (Mucina & Rutherford, 2006). The surrounding natural area associated with the relevant vegetation type, is extremely vast and homogenous and largely undeveloped. The entire assessment area is also merely categorised as other natural land in accordance with the Northern Cape Provincial Biodiversity Plan.

No Red Data Listed, provincially- or nationally protected or any other species of conservational significance were found to be present within the assessment area. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species. This will ensure that no provincially protected or significant species have potentially been omitted. The assessment area does not fall within an Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map), and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the assessment area for breeding or persistence purposes. A small isolated clump of small mammal burrows is present within the assessment area. The mobility of such animals along with the vast, continuous, undeveloped surrounding natural landscape however allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas.

Due to the flat topography of the assessment area and surrounding landscape, there are no watercourses or any drainage lines within the immediate vicinity of the assessment area.

The assessment area scored a low EIS value because the biodiversity is ubiquitous and not unique due to the extremely vast and homogenous and largely undeveloped surrounding natural landscape. The assessment area is therefore not viewed as being of high conservational significance for habitat

preservation or ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type or surface water catchment and drainage area.

It is in the opinion of the specialist that there are no potentially significant ecological impacts associated with the proposed agricultural development. All identified potential ecological impacts can be suitably reduced and mitigated to within acceptable levels. Although Alternative 1 (preferred) scored slightly higher risk ratings than Alternative 2, the difference in ecological impact is not deemed significant due to the small relative increase in transformed footprint. Either of the alternatives can therefore be considered by the competent authority for environmental authorisation and approval.

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

11. References

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