

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

**Loxton Residential Development,
Loxton, Northern Cape Province**

June 2018

Compiled for:



COGHSTA
Department of Co-operative Governance,
Human Settlements & Traditional Affairs Northern Cape

Compiled by:

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Executive Summary

The project applicant, Ubuntu Local Municipality historically cleared an approximate 26.6 ha portion of natural vegetation for the development of low cost housing in the informal settlement directly adjacent north-west of the town of Loxton, Northern Cape Province. The necessary underground services such as water reticulation, sewage and electrical infrastructure was also installed at the time but no formal aboveground housing infrastructure development took place. No Environmental Authorisation was however initially obtained from the Northern Cape Department of Environment and Nature Conservation (DENC) as is legally required by the National Environmental Management Act (Act 107 of 1998) (NEMA). The applicant has subsequently been made aware of this legal transgression and has therefore opted to follow a Section 24G process in accordance with NEMA in order to rectify the situation.

Eco-Con Environmental was appointed by the Department of Co-operative Governance, Human Settlements and Traditional Affairs Northern Cape (COGHSTA) as the independent Environmental Practitioner (EAP) to conduct the NEMA Section 24G rectification process.

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

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

A site visit/assessment for the project area was conducted on 13 June 2018. This date forms part of the winter season. It must therefore be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

Methodology

The project footprint area and the surrounding natural, undeveloped areas were assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present. Species were listed and categorised as per the Red Data Species List;

Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the Northern Cape Nature Conservation Act (Act 9 of 2009). Georeferenced photographs were taken of ecologically sensitive areas as well as the relevant nationally or provincially protected species encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

Impacts caused by the development on the surrounding natural environment were identified, evaluated and rated. The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the development area were also assessed and rated.

Study Area

The project area consists of a single surface footprint area of approximately 26.6 ha in size. The area is situated in the informal settlement directly adjacent north-west of the town of Loxton, Northern Cape Province. The area forms part of the Ubuntu 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 63 provincial road from the north.

According to SANBI (2006-), the project area and surrounding natural, undeveloped areas form part of the Eastern Upper Karoo vegetation type (NKu 4). This vegetation type is characterised by flats and gently sloping plains dominated by microphyllous shrubs with white grasses. It is classified as least threatened as little has been transformed thus far (SANBI, 2006-).

Although the project area is indicated as completely transformed in accordance with the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCSBP), the eastern portion of the assessment area and surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1). 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).

Results and Conclusion

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. An historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past.

The historic ecology of the project area is assumed to have been comparable to that of the surrounding natural, undeveloped areas as no significant change in soil structure, landscape topography or other features is evident. The immediately surrounding landscape to the west and north of the project area is undeveloped but is in a moderately disturbed and degraded state. This degraded condition has mainly been caused by anthropogenic disturbances arising from the adjacent residential settlements in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock. The landscape is therefore not necessarily reminiscent of the natural climactic state of the relevant Eastern Upper Karoo vegetation type (NKu 4) and the area scored a moderate PES rating. The relevant vegetation type is classified as least threatened (SANBI, 2006-).

The eastern portion of the project area and surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1) in accordance with the NCSBP. The CBA 1 mainly forms part of the broader surface water catchment and drainage area towards the Brak River to the south. The ephemeral water drainage line to the west as well as the two ephemeral watercourses within the eastern portion form a significant part of the broader surface water catchment and drainage area towards the river. They should be adequately buffered out of the development. A minimum 32 m buffer is recommended around the two significant ephemeral watercourses traversing the eastern portion of the project area and no development is allowed to take place within the buffer zones.

Although the project area scored a moderate to low current PES values, the current Ecological Importance and Sensitivity (EIS) of the area is still classified as Class B (high) as the eastern portion of the project area and surrounding undeveloped area to the north is still viewed as being of relatively high conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1.

Although no Red Data Listed-, or nationally protected species were found to be present, a number of provincially protected species are present within the eastern portion of the project area. It is therefore assumed that the entire project area and surrounding undeveloped landscape would historically probably have housed numerous provincially protected bulbous and other forb species associated with the relevant vegetation type.

Due to the presence of existing residential infrastructure, the undeveloped landscape to the west and north is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. The project area and surrounding landscape does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map) and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes.

It is the opinion of the specialist that the the virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible. The identified significant ecological impact associated with the impeding and contamination of the drainage line to the west and the two significant ephemeral watercourses associated with the CBA 1 can be suitably managed and mitigated to prevent further significant negative impact. Adequate and unimpeded drainage and flow of surface water runoff from the project area towards the Brak River to the south is imperative for the continued ecological functionality of the CBA 1.

As the project commenced prior to the development of the NCSBP, the project does not necessarily warrant the requirement of an offset area to be identified and assessed (due to the impact on the CBA 1) or for project operations to be completely ceased. The project operations should be allowed to continue but all recommended mitigations measures as per this ecological report must be adequately implemented and managed for the remainder of the operational phase. All necessary authorisations and permits must also be obtained as soon as reasonably and practicably possible. The project should therefore be considered by the competent authority for Environmental Authorisation and approval.

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Abbreviations

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
COGHSTA	Department of Co-operative Governance, Human Settlements and Traditional Affairs Northern Cape
DENC	Northern Cape Department of Environment and Nature Conservation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
MAP	Mean Annual Precipitation
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMA	National Environmental Management Act (Act 107 of 1998)
NFA	National Forests Act (Act 84 of 1998)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
SDF	Spatial Development Framework
WULA	Water Use License Application

Declaration of Independence

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

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

AJH Lamprecht



Signature

1. Introduction

The project applicant, Ubuntu Local Municipality historically cleared an approximate 26.6 ha portion of natural vegetation for the development of low cost housing in the informal settlement directly adjacent north-west of the town of Loxton, Northern Cape Province. The necessary underground services such as water reticulation, sewage and electrical infrastructure was also installed at the time but no formal aboveground housing infrastructure development took place. No Environmental Authorisation was however initially obtained from the Northern Cape Department of Environment and Nature Conservation (DENC) as is legally required by the National Environmental Management Act (Act 107 of 1998) (NEMA). The applicant has subsequently been made aware of this legal transgression and has therefore opted to follow a Section 24G process in accordance with NEMA in order to rectify the situation.

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

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

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

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

2. Date and Season of Ecological Site Assessment

A site visit/assessment for the project area was conducted on 13 June 2018. This date forms part of the winter season. It must therefore be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

3. Assessment Rational

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

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

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

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

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

4. Objectives of the Assessment

Ecological and habitat survey:

- Identify and list significant faunal and floral species encountered on and around the 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 project area and the surrounding natural, undeveloped areas. This will provide an indication of the assumed historic condition of the project area.
- Determine and discuss the ecological sensitivity and significance of the project area and the surrounding natural, undeveloped areas.
- Identify and delineate all watercourses/wetland areas potentially present on the project area.
- Identify, evaluate and rate the ecological impacts of the project on the natural environment.
- Provide recommendations on mitigation and management measures in order to attempt to reduce/alleviate these identified ecological impacts.
- A digital report (this document) as well as the digital KML files of any identified sensitive areas will be provided to the applicant.

5. Methodology

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

The **Present Ecological State (PES)** of the project area and the surrounding natural, undeveloped areas were 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 completely modified with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible.

The **Ecological Importance and Sensitivity (EIS)** of the project area and the surrounding natural, undeveloped areas were 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.

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

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

Evaluation Component	Rating Scale and Description/Criteria
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>

<p>Extent of Positive or Negative Impact</p>	<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>
<p>Irreplaceability of Natural Resources being impacted upon</p>	<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>
<p>Reversibility of Impact</p>	<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>
<p>Probability of Impact Occurrence</p>	<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>
<p>Cumulative Impact</p>	<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 ecological impact, the Significance Score of each ecological impact is calculated by using the following formula:

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

The maximum Significance Score value is 150.

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

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

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

- Wetlands were identified and delineated (if any) on the project area as per the methodology described below:

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

In 2005 DWAF published a wetland delineation procedure in a guideline document titled “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas”. Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments. These guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas and is that part of the wetland that remains flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

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

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

In addition, the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. A protective 32 m buffer zone, beginning from the outer edge of the wetland temporary zone, must be implemented and designated as sensitive within which no development must be allowed to occur.

6. Study Area

The project area consists of a single surface footprint area of approximately 26.6 ha in size. The area is situated in the informal settlement directly adjacent north-west of the town of Loxton, Northern Cape Province. The area forms part of the Ubuntu 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 63 provincial road from the north.

See locality map below.



Figure 1: Locality map illustrating the project 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 230 mm (www.climate-data.org). The maximum average monthly temperature is approximately 22°C in the summer months while the minimum average monthly temperature is approximately 6.2°C during the winter. Maximum daily temperatures can reach up to 30.6°C in the summer months and dip to as low as -1.5°C during the winter.

6.2. Geology and Soils

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

Mudstones and sandstones of the Beaufort Group supporting duplex soils with prisma-cutanic and/or pedocutanic diagnostic horizons dominant (Da landtype) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types).

6.3. Vegetation and Conservation Status

According to SANBI (2006-), the project area and surrounding natural, undeveloped areas form part of the Eastern Upper Karoo vegetation type (NKu 4). This vegetation type is characterised by flats and gently sloping plains dominated by microphyllous shrubs with white grasses. It is classified as least threatened as little has been transformed thus far (SANBI, 2006-).

Although the project area is indicated as completely transformed in accordance with the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCSBP), the eastern portion of the assessment area and surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1). 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 existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments.

See vegetation and sensitivity maps below.

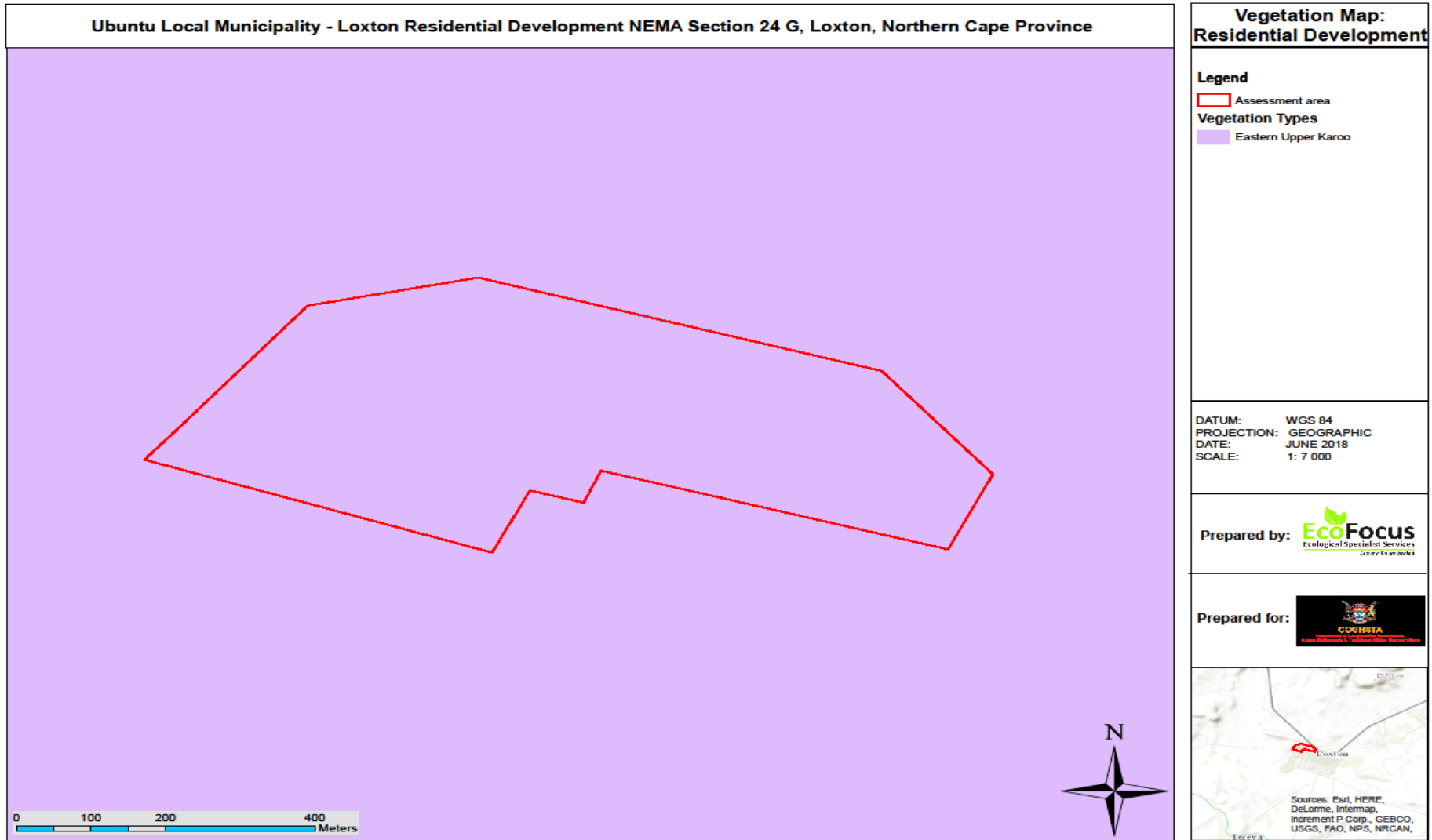


Figure 2: Vegetation map illustrating the vegetation type associated with the project area and surrounding natural, undeveloped areas (see A3 sized map in the Appendices)

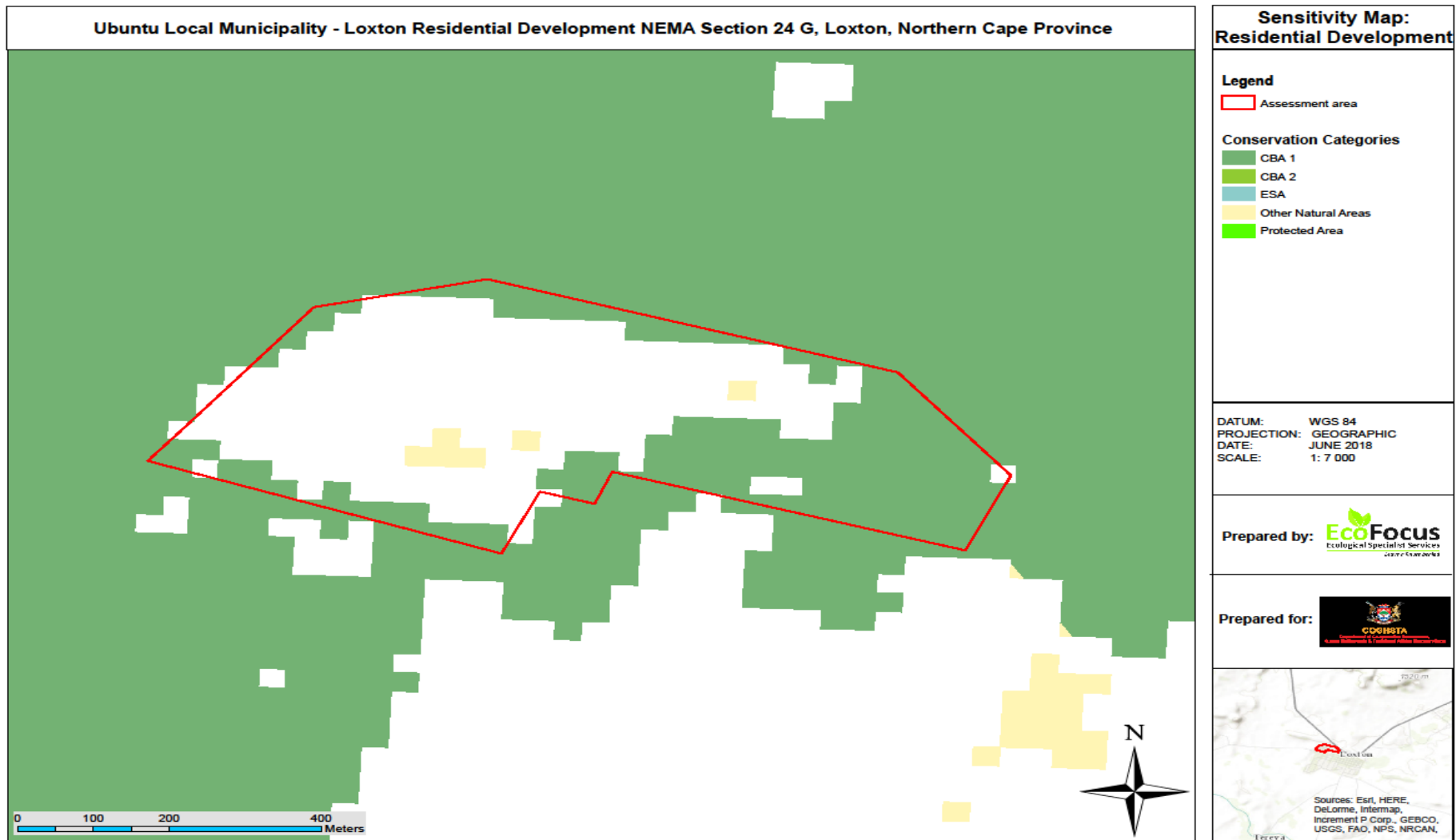


Figure 3: Sensitivity map illustrating the conservation statuses associated with the project area and surrounding natural, undeveloped areas (see A3 sized map in the Appendices)

7. Assumptions, Uncertainties and Gaps in Knowledge

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

- all relevant project information provided by the applicant and engineering design team to the ecological specialist was correct and valid at the time that it was provided.
- the project area as provided by the engineering design team is correct and will not be significantly deviated from as this was the only area assessed.
- the necessary environmental authorisations have been successfully obtained for the surrounding residential developments.
- the public, local communities, relevant organs of state and landowners will receive a sufficient reoccurring opportunity to participate and comment on the project during the NEMA Section 24G rectification process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the project was based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints.
- the NEMA Section 24G rectification process is a retrospective assessment process and the specialists are limited to assessing the anticipated historic condition of the project area based on the surrounding natural, undeveloped areas.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making.
- The date on which the site assessment was conducted, forms part of the winter season. It must therefore be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

Given that the Section 24G rectification process involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as observations and conclusions are made, only based on professional specialist opinion. 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 Section 24G rectification process. Continual two way

communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.

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

Gaps in knowledge can be attributed to:

- The ecological study process was undertaken retrospectively after the original surface vegetation had already been transformed by the development. The anticipated historic condition of the project site is therefore purely based on the vegetation of the surrounding natural, undeveloped areas.
- The potential of future similar developments in the same geographical area which could lead to cumulative impacts cannot be meaningfully anticipated. It is however expected that further residential development is likely to take place in the broader area.

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

8. Results and Discussion

The assessment area has been separated into two portions for reporting purposes namely the western/central portion and the eastern portion. Both of these portions will be discussed separately.

8.1. Western/Central Portion

8.1.1. Current Existing Vegetation and Site Condition

The western/central portion of the project area constitutes an existing dense informal residential settlement which has completely transformed all previously existing natural surface vegetation on the project area. The sparse vegetation present within most residential properties of the western/central portion of the project area mainly consist of exotic and/or legally declared alien invasive species which serve ornamental and/or shading purposes. Such species include *Ligustrum lucidum* (Category 3), *Schinus molle* (exotic), *Melia azedarach* (Category 3), *Ricinus communis* (Category 2), *Prosopis sp.* (Category 3) & *Canna indica* (Category 1b). No Red Data Listed, provincially- or nationally protected or any other species of conservational significance were found to be present within the western/central portion of the project area.





Figure 4: Two images illustrating the completely transformed landscape of the western/central portion of the project area

A natural elevated ridge is present along the western and northern boundaries of this western/central portion of the project area. The immediately surrounding landscape atop the ridge is undeveloped but is in a moderately disturbed and degraded state. This degraded condition has mainly been caused by anthropogenic disturbances arising from the adjacent residential settlements in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock. Such anthropogenic activities tend to cause an ecological 'edge effect' which negatively impacts on the urban/rural interface area and increases the impact footprint. The landscape is therefore not necessarily reminiscent of the natural climactic state of the relevant vegetation type. The only significant species found to be present include *Tetragonia calycina*, *Mesembryanthemum crystallinum*, *Phyllobolus sp.*, *Malephora crocea* (all provincially protected), an unidentified bulb species (all provincially protected) & *Atriplex sp.*



Figure 5: Image illustrating the moderately disturbed and degraded condition of the surrounding landscape atop the ridge mainly caused by domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock



Figure 6: Image illustrating the presence of the unidentified bulb plant species

Surface water drains from the topographically higher ridge areas through the informal settlement towards the south. A distinct ephemeral water drainage line is present along the western boundary of the project area. This drainage line is however significantly obstructed by existing informal housing developments and it eventually artificially dams up against the dirt road to the south of the project area. The drainage line is also significantly polluted by domestic garbage/waste dumping from the surrounding residential settlements. This drainage line forms part of the broader surface water catchment area and drainage towards the Brak River to the south and should therefore be adequately buffered out of the development. No development is allowed to take place within the buffer zone. Existing obstructions which impede the flow of the drainage line within the buffer zone should be cleared. A culvert should be constructed underneath the dirt road to the south of the project area as the artificial damming up of the water against the road is impeding the flow and integrity of the drainage line. An active community waste clean-up initiative will also have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste within the drainage line.



Figure 7: Two images illustrating the water drainage line along the western boundary of the project area as well as its significant obstruction by existing informal housing developments



Figure 8: Image illustrating the artificial damming up of the water drainage line against the dirt road to the south of the project area

Two artificial surface water drainage channels have been constructed along the northern boundary of the western/central portion of the project area. These channels drain surface water runoff from the topographically higher ridge areas along the northern boundary through the informal settlement towards the south. The drainage channels are however in an unmaintained condition which has led to significant erosion along the water flow paths. Adequate stormwater management and channelling infrastructure should be implemented within the western/central portion of the project area in order to sufficiently manage surface water runoff emanating from the topographically higher ridge area along the western and northern boundaries. The stormwater management infrastructure must ensure adequate and unimpeded drainage and flow of surface water runoff from the western/central portion of the project area towards the Brak River to the south.



Figure 9: Two images illustrating the artificially constructed surface water drainage channels which drain surface water runoff through the informal settlement towards the south



Figure 10: Image illustrating the significant erosion along the water flow paths of the surface water drainage channels

Due to the presence of existing residential infrastructure, the surrounding undeveloped landscape atop the ridge is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. The project area and surrounding landscape does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map) and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes.

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

The Present Ecological State (PES) of the western/central portion of the project area is classified as Class F as it is critically/extremely modified. Transformation has reached a critical level and the ecosystem has been completely modified with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible. The Present Ecological State (PES) of the surrounding undeveloped landscape atop the ridge is classified as Class C as it is moderately modified. Moderate loss and transformation of natural habitat and biota have occurred due to continued disturbance caused by anthropogenic activities in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock, but the basic ecosystem functionality has still remained predominantly unchanged.

The western/central portion of the project area and surrounding natural, undeveloped areas fall within the Eastern Upper Karoo vegetation type (NKu 4) which is classified as least threatened (SANBI, 2006-). The surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1) in accordance with the NCSBP. The CBA 1 mainly forms part of the broader surface water catchment and drainage area towards the Brak River to the south.

The surrounding undeveloped landscape atop the ridge is in a moderately disturbed and degraded state caused by continued anthropogenic activities. Although no Red Data Listed-, or nationally protected species were found to be present, a number of provincially protected species are present. It is therefore assumed that the project area and surrounding undeveloped landscape would historically probably have housed numerous provincially protected bulbous and other forb species associated with the relevant vegetation type.

The historic Ecological Importance and Sensitivity (EIS) of the western/central portion of the project area and surrounding undeveloped landscape atop the ridge would probably have been classified as Class C (moderate) as it could have been viewed as ecologically important and sensitive on local or possibly provincial scale mainly due to it forming part of the broader surface water catchment and drainage area towards the Brak River to the south as well as the assumed presence of numerous provincially protected bulbous and other forb species. The western/central portion of the project area would therefore have been viewed as being of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, water catchment and drainage area and CBA 1.

Although the western/central portion of the project area scored a low current PES values, the current Ecological Importance and Sensitivity (EIS) of this area is however still classified as Class C (moderate) as it still forms part of the broader surface water catchment and drainage area towards the Brak River to the south. The western/central portion of the project area and surrounding undeveloped area atop the ridge is therefore still viewed as being of moderate conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1. Adequate and unimpeded drainage and flow of surface water runoff from the western/central portion of the project area towards the river is therefore imperative.

8.2. Eastern Portion

8.2.1. Current Existing Vegetation and Site Condition

The eastern portion of the project area houses a degree of natural vegetation associated with the relevant vegetation type but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. Anthropogenic disturbances in the form of domestic garbage/waste dumping, vegetation clearance is evident throughout the area. In accordance with the information received from the applicant, an historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past.

The immediately surrounding landscape to the north is undeveloped but is in a moderately disturbed and degraded state. This degraded condition has mainly been caused by anthropogenic disturbances arising from the adjacent residential settlements in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock. The landscape is therefore not necessarily reminiscent of the natural climactic state of the relevant vegetation type. The same significant species as found atop the ridge were found to be present within and surrounding the eastern portion of the project area namely *Tetragonia calycina*, *Mesembryanthemum crystallinum*, *Phyllobolus sp.*, *Malephora crocea* (all provincially protected), an unidentified bulb species (all provincially protected) & *Atriplex sp.*





Figure 11: These images illustrating the relatively disturbed condition of remaining natural vegetation and sporadic presence of informal housing structures within the eastern portion of the project area

Two significant ephemeral watercourses enter and traverse the eastern portion of the project area from the north and east respectively and then subsequently join up in the southern portion of the project area. Although these watercourses are not significantly obstructed by any of the existing sporadic informal housing developments, a culvert at their joining point which channels the water through under a dirt road, does not seem to provide adequate through flow capacity. It is therefore anticipated that significant damming up and push back of water would occur at this joining point during intense rainfall events (also confirmed by members of the local community). The

watercourses are also significantly polluted by domestic garbage/waste dumping from the surrounding residential settlements. These watercourses form a significant part of the broader surface water catchment and drainage area towards the Brak River to the south and should therefore be adequately buffered out of the development. A minimum 32 m buffer is recommended and no development is allowed to take place within the buffer zone. Existing obstructions within the buffer zone should be cleared. The existing culvert which impedes the flow of the watercourses should be redesigned and enlarged in order to allow for optimal flow at all times. An active community waste clean-up initiative will also have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste within the watercourses.

The entire eastern portion of the project area forms part of a small localised surface water catchment and drainage area south of the R 63 provincial road which feeds into the two ephemeral watercourses. Numerous small drainage lines are therefore scattered throughout the eastern portion of the project area. The drainage of this broader surface area is however moderately impeded by the sporadic presence of existing informal housing developments. Adequate stormwater management and channelling infrastructure should therefore be implemented within the eastern portion of the project area in order to sufficiently manage surface water runoff and ensure adequate and unimpeded drainage and flow of the two watercourses towards the Brak River to the south.





Figure 12: Two images illustrating the significant ephemeral watercourses traversing the eastern portion of the project area as well as their polluted condition due to domestic garbage/waste dumping from the surrounding residential settlements



Figure 13: Image illustrating the inadequately sized culvert at the joining point of the two watercourses which channels the water through under a dirt road towards the south

Due to the presence of existing residential infrastructure, the eastern portion of the project area and surrounding undeveloped landscape to the north is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. The project area and

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

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

The Present Ecological State (PES) of the eastern portion of the project area is classified as Class C as it is moderately modified. Moderate loss and transformation of natural habitat and biota have occurred due to sporadic establishment of informal housing developments, but the basic ecosystem functionality and flow regime of the watercourses has still remained predominantly unchanged. The Present Ecological State (PES) of the surrounding undeveloped landscape to the north is also classified as Class C as it is moderately modified. Moderate loss and transformation of natural habitat and biota have occurred due to continued disturbance caused by anthropogenic activities in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock, but the basic ecosystem functionality has still remained predominantly unchanged.

The eastern portion of the project area and surrounding natural, undeveloped areas fall within the Eastern Upper Karoo vegetation type (NKu 4) which is classified as least threatened (SANBI, 2006-). It also falls within a Critical Biodiversity Area one (CBA 1) in accordance with the NCSBP. The CBA 1 mainly forms part of the broader surface water catchment and drainage area towards the Brak River to the south.

The surrounding undeveloped landscape to the north is in a moderately disturbed and degraded state caused by continued anthropogenic activities. Although no Red Data Listed-, or nationally protected species were found to be present, a number of provincially protected species are present. It is therefore assumed that the project area and surrounding undeveloped landscape would historically probably have housed numerous provincially protected bulbous and other forb species associated with the relevant vegetation type.

The historic Ecological Importance and Sensitivity (EIS) of the eastern portion of the project area and surrounding undeveloped landscape to the north would probably have been classified as Class B (high) as it could have been viewed as ecologically important and sensitive on provincial scale mainly due to the presence of the two ephemeral watercourses which form a significant part of the broader surface water catchment and drainage area towards the Brak River to the south as well as the

assumed presence of numerous provincially protected bulbous and other forb species. The eastern portion of the project area would therefore have been viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and water catchment and drainage area associated with the CBA 1.

Although the eastern portion of the project area scored a moderate current PES values, the current Ecological Importance and Sensitivity (EIS) of this area is however still classified as Class B (high) as the two ephemeral watercourses still form a significant part of the broader surface water catchment and drainage area towards the Brak River to the south. The eastern portion of the project area and surrounding undeveloped area to the north is therefore still viewed as being of relatively high conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1. Adequate and unimpeded drainage and flow of surface water runoff from the eastern portion of the project area towards the river is therefore imperative for the continued ecological functionality of the CBA 1.

8.3. Ecological Sensitivity Map

The sensitivity map below illustrates the buffer zones to be implemented around the water drainage line to the west and the two significant ephemeral watercourses. It also illustrates the presence of the two artificial water drainage channels.



Figure 14: Sensitivity map illustrating the buffer zones to be implemented around the water drainage line to the west and the two significant ephemeral watercourses as well as the presence of the two artificial water drainage channels

9. Ecological Impact Assessment

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

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

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

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

9.1. Ecological Impacts Caused by the Project

Transformation of terrestrial vegetation on the project area associated with the Eastern Upper Karoo vegetation type (NKu 4)

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. An historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past. The vegetation type is classified as least threatened (SANBI, 2006-).

The surrounding landscape to the west and north of the project area is undeveloped but is in a moderately disturbed and degraded state. This degraded condition has mainly been caused by anthropogenic disturbances arising from the adjacent residential settlements in the form of

domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock. The landscape is therefore not necessarily reminiscent of the natural climactic state of the relevant vegetation type and the area scored a moderate PES rating. The significance of this impact was medium-high for the western/central portion and medium for the eastern portion.

Mitigation measures to reduce impacts are recommended under heading 9.3.

Transformation of a Critical Biodiversity Area one (CBA 1) associated with the project area

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. An historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past. The surrounding landscape to the west and north of the project area is undeveloped but is in a moderately disturbed and degraded state caused by continued anthropogenic activities.

The eastern portion of the project area and surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1) in accordance with the NCSBP. The CBA 1 mainly forms part of the broader surface water catchment and drainage area towards the Brak River to the south. The water drainage line to the west as well as the two ephemeral watercourses traversing the eastern portion of the project area form a significant part of the broader surface water catchment and drainage area towards the river.

The drainage line to the west is significantly obstructed by existing informal housing developments and it eventually artificially dams up against the dirt road to the south of the project area. Although the two ephemeral watercourses are not significantly obstructed by any of the existing sporadic informal housing developments, a culvert at their joining point which channels the water through under a dirt road, does not seem to provide adequate through flow capacity. It is therefore anticipated that significant damming up and push back of water would occur at this joining point during intense rainfall events (also confirmed by members of the local community). The drainage line and two watercourses are also significantly polluted by domestic garbage/waste dumping from the surrounding residential settlements.

Although the project area scored a moderate to low current PES values, the current Ecological Importance and Sensitivity (EIS) of the eastern portion of the project area is still classified as Class B (high) as the eastern portion and surrounding undeveloped area to the north is still viewed as being of relatively high conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1. The significance of this impact was medium for the western/central portion and medium-high for the eastern portion.

Mitigation measures to reduce impacts are recommended under heading 9.3.

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

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. An historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past. The surrounding landscape to the west and north of the project area is undeveloped but is in a moderately disturbed and degraded state caused by continued anthropogenic activities.

Although no Red Data Listed-, or nationally protected species were found to be present, a number of provincially protected species are present within the eastern portion of the project area. It is therefore assumed that the entire project area and surrounding undeveloped landscape would historically probably have housed numerous provincially protected bulbous and other forb species associated with the relevant vegetation type. These will all have been destroyed by the development activities within the western/central portion.

Due to the presence of existing residential infrastructure, the undeveloped landscape to the west and north is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. The project area and surrounding landscape does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map) and no important bird species,

unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The significance of this impact was medium.

Mitigation measures to reduce impacts are recommended under heading 9.3

Terrestrial and aquatic alien invasive species establishment

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. The sparse vegetation present within most residential properties of the western/central portion of the project area mainly consist of exotic and/or legally declared alien invasive species which serve ornamental and/or shading purposes. Such species include *Ligustrum lucidum* (Category 3), *Schinus molle* (exotic), *Melia azedarach* (Category 3), *Ricinus communis* (Category 2), *Prosopis sp.* (Category 3) & *Canna indica* (Category 1b).

There are no significant establishments of alien invasive species present within the eastern portion of the project area. Continued anthropogenic activities and disturbance could however result in establishing and spreading of invasive species within the project area and into surrounding areas. The significance of this impact was medium for the western/central portion and low for the eastern portion.

Mitigation measures to reduce impacts are recommended under heading 9.3.

Surface material erosion

The entire project area forms part of a small localised surface water catchment and drainage area south of the R 63 provincial road which feeds into the drainage line to the west and the two ephemeral watercourses. Numerous small drainage lines are therefore scattered throughout the eastern portion of the project area. Two artificial surface water drainage channels have been constructed along the northern boundary of the western/central portion of the project area. These channels drain surface water runoff from the topographically higher ridge areas along the northern boundary through the informal settlement towards the south. The drainage channels are however in an unmaintained condition which has led to significant erosion along the water flow paths.

No significant erosion is evident yet within the eastern portion of the assessment area. However, due to the slightly sloping topography of the project area to the south, erosion is likely to occur and increase during intense rainfall events. The significance of this impact was medium for the western/central portion and low for the eastern portion.

Mitigation measures to reduce impacts are recommended under heading 9.3.

Impeding and contamination of the water drainage line and two watercourses

The entire project area forms part of a small localised surface water catchment and drainage area south of the R 63 provincial road which feeds into the water drainage line to the west and the two ephemeral watercourses. The area falls within a Critical Biodiversity Area one (CBA 1) which forms part of the broader surface water catchment and drainage area towards the Brak River to the south. The drainage line as well as the two watercourses form a significant part of the broader surface water catchment and drainage area towards the river.

The drainage line to the west is significantly obstructed by existing informal housing developments and it eventually artificially dams up against the dirt road to the south of the project area. Although the two watercourses are not significantly obstructed by any of the existing sporadic informal housing developments, a culvert at their joining point which channels the water through under a dirt road, does not seem to provide adequate through flow capacity. It is therefore anticipated that significant damming up and push back of water would occur at this joining point during intense rainfall events (also confirmed by members of the local community). The drainage line and two watercourses are also significantly polluted by domestic garbage/waste dumping from the surrounding residential settlements.

The activities associated with the new construction phase of the proposed development could potentially impede on the flow regime of the drainage line and two watercourses due to artificial obstruction of natural surface water flow during rainfall events. These construction phase activities could potentially also result in significant pollution of the surface water catchment and drainage due to contamination of natural surface water flow by erosion and hydrocarbon or other chemical spills. The significance of this impact was medium.

Mitigation measures to reduce impacts are recommended under heading 9.3.

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

Disposing of domestic garbage/waste into the natural areas surrounding the residential settlements currently takes place extensively. Such anthropogenic activities tend to cause an ecological 'edge effect' which negatively impacts on the urban/rural interface area and increases the impact footprint. The new project could result in significant continued disposal and dumping of domestic waste/garbage into the surrounding natural areas outside the residential footprint which will negatively impact on the integrity of the surrounding natural areas and expand the negative anthropogenic footprint. The significance of this impact was medium.

Mitigation measures to reduce impacts are recommended under heading 9.3.

9.2. Cumulative Impacts

The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible. Due to the vast surrounding undeveloped natural landscape within the broader area, the project area presents a low localised increase in residual cumulative negative impact on the transformation of the relevant vegetation type which is classified as least threatened SANBI (2006-).

Due to the eastern portion of the assessment area falling within a CBA 1 mainly associated with the broader surface water catchment and drainage area towards the Brak River to the south, the area and surrounding undeveloped area to the north is viewed as being of relatively high conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1. The project area currently has had a medium-high negative impact on the impeding and contamination of the catchment and drainage area and subsequent CBA 1. No other significant cumulative obstructions of the surface water catchment and drainage area are however evident within the broader surrounding areas so the project does not add to a significant cumulative impact on the catchment.

Adequate and unimpeded drainage and flow of surface water runoff from the project area towards the river is imperative for the continued ecological functionality of the CBA 1. Adequate implementation and management of all the recommended mitigation measures as per this ecological report should suitably reduce the residual impacts on the CBA 1 and water catchment and drainage area to within acceptable levels.

All other ecological impacts caused by the project have relatively low residual cumulative impacts which can be suitably reduced and mitigated to within acceptable levels.

9.3. Risk Ratings of Potential Impacts

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

Table 5: Environmental Risk and Significance Ratings

	Western/Central Portion	Eastern Portion
Identified Environmental Impact	Transformation of terrestrial vegetation on the project area associated with the Eastern Upper Karoo vegetation type (NKu 4)	
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	Irreversible (5)	Low (4)
Probability of Impact Occurrence	Definite (5)	High (4)
Cumulative Impact Rating prior to mitigation	Medium	Medium
Environmental Significance Score and Rating prior to mitigation	Medium-High (85)	Medium (56)
Mitigation Measures to be implemented	The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible.	

The ephemeral water drainage line traversing the western/central portion and the two significant ephemeral watercourses traversing the eastern portion of the project area should be adequately buffered out of the development. A minimum 32 m buffer is recommended around the two significant ephemeral watercourses traversing the eastern portion of the project area and no development is allowed to take place within the buffer zones.

Adequate stormwater management and channelling infrastructure should be implemented within the entire project area in order to sufficiently manage surface water runoff and ensure adequate and unimpeded drainage and flow of the water drainage line and the two watercourses towards the Brak River to the south.

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

No site construction camp to be established within the surrounding natural areas outside the project area. If site camps are required outside the project area, they must be set up in the adjacently located urban areas to the east so as not to impact on the surrounding natural vegetation to the west and north of the project area.

Adequately fence off the construction area and ensure that no construction activities, machinery or equipment operate or impact outside the fenced off areas to the west or north.

Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas to the west or north of the project area.

	<p>Continued domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock within the surrounding natural areas to the west and north of the project area must be prevented. Implement adequate waste collection and disposal management measures for the existing residential settlements in order to prevent undesired disposal/dumping into the surrounding natural areas.</p> <p>Provide training interventions for the local community on the correct management of domestic waste/garbage within the existing residential settlements.</p> <p>Areas directly adjacent west and north of the project area must be adequately rehabilitated as soon as practicably possible in order to prevent further significant increase in the extent of the ecological 'edge effect'.</p> <p>Sufficient grazing/browsing management plans and practices must be implemented for local livestock in order to prevent continued significant overgrazing of surrounding undeveloped areas to the west.</p>	
<p>Cumulative Impact Rating after mitigation implementation</p>	<p>Low</p>	<p>Low</p>
<p>Environmental Significance Score and Rating after mitigation implementation</p>	<p>Medium (64)</p>	<p>Medium (52)</p>

	Western/Central Portion	Eastern Portion
Identified Environmental Impact	Transformation of a Critical Biodiversity Area one (CBA 1) associated with the project area	
Magnitude of Negative or Positive Impact	Low (4)	Medium (6)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)
Extent of Positive or Negative Impact	Regional (3)	Regional (3)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)
Reversibility of Impact	Moderate (3)	Moderate (3)
Probability of Impact Occurrence	High (4)	High (4)
Cumulative Impact Rating prior to mitigation	Medium	Medium
Environmental Significance Score and Rating prior to mitigation	Medium (68)	Medium-High (76)
Mitigation Measures to be implemented	<p>The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible.</p> <p>The ephemeral water drainage line traversing the western/central portion and the two significant ephemeral</p>	

watercourses traversing the eastern portion of the project area should be adequately buffered out of the development. A minimum 32 m buffer is recommended around the two significant ephemeral watercourses traversing the eastern portion of the project area and no development is allowed to take place within the buffer zones.

Adequate stormwater management and channelling infrastructure should be implemented within the entire project area in order to sufficiently manage surface water runoff and ensure adequate and unimpeded drainage and flow of the water drainage line and the two watercourses towards the Brak River to the south.

Existing obstructions which impede the flow of the drainage line and two watercourses within the buffer zone should be cleared and rehabilitated.

A culvert should be constructed underneath the dirt road to the south of the project area in order to prevent damming up of water and ensure unimpeded flow of the drainage line to the west.

The existing culvert which impedes the flow of the two watercourses should be redesigned and enlarged in order to allow for optimal flow at all times.

An active community waste clean-up initiative will also have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste within the drainage line and two watercourses.

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

areas may take place.

No site construction camp to be established within the surrounding natural areas outside the project area. If site camps are required outside the project area, they must be set up in the adjacently located urban areas to the east so as not to impact on the surrounding natural vegetation to the west and north of the project area.

Adequately fence off the construction area and ensure that no construction activities, machinery or equipment operate or impact outside the fenced off areas to the west or north.

Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas to the west or north of the project area.

Continued domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock within the surrounding natural areas to the west and north of the project area must be prevented. Implement adequate waste collection and disposal management measures for the existing residential settlements in order to prevent undesired disposal/dumping into the surrounding natural areas.

Provide training interventions for the local community on the correct management of domestic waste/garbage within the existing residential settlements.

Areas directly adjacent west and north of the project area must be adequately rehabilitated as soon as practicably possible in order to prevent further significant increase in the extent of the ecological 'edge effect'.

	Sufficient grazing/browsing management plans and practices must be implemented for local livestock in order to prevent continued significant overgrazing of surrounding undeveloped areas to the west.	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (45)	Medium (51)
	Western/Central Portion	Eastern Portion
Identified Environmental Impact	Destruction/damage to Red Data Listed, nationally or provincially protected species individuals/habitats	
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	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	Medium	Medium
Environmental Significance Score and Rating prior to mitigation	Medium (68)	Medium (60)
Mitigation Measures to be implemented	<p>The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible. The new project construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>The new project construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>No site construction camp to be established within the surrounding natural areas outside the project area. If site camps are required outside the project area, they must be set up in the adjacently located urban areas to the east so as not to impact on the surrounding natural vegetation to the west and north of the project area.</p> <p>Adequately fence off the construction area and ensure that no construction activities, machinery or equipment operate or impact outside the fenced off areas to the west or north.</p> <p>Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas to the west or</p>	

	<p>north of the project area.</p> <p>Continued domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock within the surrounding natural areas to the west and north of the project area must be prevented. Implement adequate waste collection and disposal management measures for the existing residential settlements in order to prevent undesired disposal/dumping into the surrounding natural areas.</p> <p>Provide training interventions for the local community on the correct management of domestic waste/garbage within the existing residential settlements.</p> <p>Areas directly adjacent west and north of the project area must be adequately rehabilitated as soon as practicably possible in order to prevent further significant increase in the extent of the ecological 'edge effect'.</p> <p style="padding-left: 40px;">Certain provincially protected species must be re-established within the rehabilitated areas. A suitably qualified and experienced ecologist must be consulted in order to advise on this process.</p> <p>Sufficient grazing/browsing management plans and practices must be implemented for local livestock in order to prevent continued significant overgrazing of surrounding undeveloped areas to the west.</p>	
<p>Cumulative Impact Rating after mitigation implementation</p>	<p>Low</p>	<p>Low</p>
<p>Environmental Significance Score and Rating after mitigation implementation</p>	<p>Medium (64)</p>	<p>Low (42)</p>

	Western/Central Portion	Eastern Portion
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	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Definite (5)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Medium (70)	Low (36)
Mitigation Measures to be implemented	<p>All Category 1b and 2 alien invasive species individuals currently within the project area, must be actively eradicated and adequately disposed of in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014.</p> <p>If any Category 2 species are however to be left in situ, alien invasive species permits must be obtained from the competent authority in accordance with the above-mentioned regulations.</p>	

	<p>Category 3 species may remain in prescribed areas and provinces but further planting, propagation and/or trade is prohibited.</p> <p>Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the construction and operational phases of the new project. Such a management plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>No site construction camp to be established within the surrounding natural areas outside the project area. If site camps are required outside the project area, they must be set up in the adjacently located urban areas to the east so as not to impact on the surrounding natural vegetation to the west and north of the project area.</p> <p>Adequately fence off the construction area and ensure that no construction activities, machinery or equipment operate or impact outside the fenced off areas to the west or north.</p> <p>Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas to the west or north of the project area.</p> <p>Areas directly adjacent west and north of the project area must be adequately rehabilitated as soon as practicably possible in order to prevent significant alien invasive species establishment and spreading.</p>	
<p>Cumulative Impact Rating after mitigation implementation</p>	<p>Low</p>	<p>Low</p>

Environmental Significance Score and Rating after mitigation implementation	Low (22)	Low (22)
	Western/Central Portion	Eastern Portion
Identified Environmental Impact	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	Moderate (3)	Moderate (3)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	High (4)	Medium (3)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Medium (56)	Low (36)

Mitigation Measures to be implemented	<p>Adequate stormwater management and channelling infrastructure should be implemented within the entire project area in order to sufficiently manage surface water runoff and ensure adequate and unimpeded drainage and flow of the water drainage line and the two watercourses towards the Brak River to the south.</p> <p>An adequate Storm Water and Erosion Management Plan must be implemented during the construction and operational phases of the new project. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to prevent any significant erosion from occurring.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (22)	Low (22)
	Western/Central Portion	Eastern Portion
Identified Environmental Impact	Impeding and contamination of the water drainage line and two watercourses	
Magnitude of Negative or Positive Impact	Low (4)	Medium (6)
Duration of Negative or Positive Impact	Medium term (3)	Medium term (3)
Extent of Positive or Negative Impact	Regional (3)	Regional (3)

Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)
Reversibility of Impact	Moderate (3)	Moderate (3)
Probability of Impact Occurrence	High (4)	High (4)
Cumulative Impact Rating prior to mitigation	Medium	Medium
Environmental Significance Score and Rating prior to mitigation	Medium (64)	Medium (72)
Mitigation Measures to be implemented	<p>The ephemeral water drainage line traversing the western/central portion and the two significant ephemeral watercourses traversing the eastern portion of the project area should be adequately buffered out of the development. A minimum 32 m buffer is recommended around the two significant ephemeral watercourses traversing the eastern portion of the project area and no development is allowed to take place within the buffer zones.</p> <p>Adequate stormwater management and channelling infrastructure should be implemented within the entire project area in order to sufficiently manage surface water runoff and ensure adequate and unimpeded drainage and flow of the water drainage line and the two watercourses towards the Brak River to the south.</p> <p>Existing obstructions which impede the flow of the drainage line and two watercourses within the buffer zone should be cleared and rehabilitated.</p> <p>A culvert should be constructed underneath the dirt road to the south of the project area in order to prevent</p>	

	<p>damming up of water and ensure unimpeded flow of the drainage line to the west.</p> <p>The existing culvert which impedes the flow of the two watercourses should be redesigned and enlarged in order to allow for optimal flow at all times.</p> <p>An active community waste clean-up initiative will also have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste within the drainage line and two watercourses.</p> <p>If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably possible from the drainage line and the two watercourses and their buffer zones.</p> <p>Hydrocarbon and other chemical storage areas must be adequately banded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.</p> <p>Adequate hydrocarbon and other chemical storage, handling and usage procedures must be developed and all relevant construction personnel must be sufficient trained on- and apply these procedures during the entire construction phase.</p>	
Cumulative Impact Rating after mitigation implementation	<p>Low</p>	<p>Low</p>
Environmental Significance Score and Rating after mitigation implementation	<p>Low (42)</p>	<p>Low (48)</p>

	Western/Central Portion	Eastern Portion
Identified Environmental Impact	Contamination of the surrounding natural areas through domestic garbage/waste dumping	
Magnitude of Negative or Positive Impact	Low (4)	Low (4)
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	Moderate (3)	Moderate (3)
Reversibility of Impact	High (2)	High (2)
Probability of Impact Occurrence	Definite (5)	Definite (5)
Cumulative Impact Rating prior to mitigation	Medium	Medium
Environmental Significance Score and Rating prior to mitigation	Medium (70)	Medium (70)
Mitigation Measures to be implemented	<p>An active community waste clean-up initiative will have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste scattered throughout the surrounding natural areas.</p> <p>Continued domestic garbage/waste dumping within the surrounding natural areas to the west and north of the project area must be prevented. Implement adequate waste collection and disposal management measures for</p>	

	<p>the existing residential settlements in order to prevent undesired disposal/dumping into the surrounding natural areas.</p> <p>Provide training interventions for the local community on the correct management of domestic waste/garbage within the existing residential settlements.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (22)	Low (22)

10. Conclusion

The existing informal settlement within the western/central portion of the project area has virtually completely transformed all previously existing natural surface vegetation. The eastern portion still houses a degree of natural vegetation but it is in a relatively disturbed condition due to the sporadic presence of informal housing developments. An historic stone quarry was also present within this area which was subsequently decommissioned and filled up again in the past.

The historic ecology of the project area is assumed to have been comparable to that of the surrounding natural, undeveloped areas as no significant change in soil structure, landscape topography or other features is evident. The immediately surrounding landscape to the west and north of the project area is undeveloped but is in a moderately disturbed and degraded state. This degraded condition has mainly been caused by anthropogenic disturbances arising from the adjacent residential settlements in the form of domestic garbage/waste dumping, vegetation clearance and overgrazing by local livestock. The landscape is therefore not necessarily reminiscent of the natural climactic state of the relevant Eastern Upper Karoo vegetation type (NKu 4) and the area scored a moderate PES rating. The relevant vegetation type is classified as least threatened (SANBI, 2006-).

The eastern portion of the project area and surrounding natural, undeveloped areas fall within a Critical Biodiversity Area one (CBA 1) in accordance with the NCSBP. The CBA 1 mainly forms part of the broader surface water catchment and drainage area towards the Brak River to the south. The ephemeral water drainage line to the west as well as the two ephemeral watercourses within the eastern portion form a significant part of the broader surface water catchment and drainage area towards the river. They should be adequately buffered out of the development. A minimum 32 m buffer is recommended around the two significant ephemeral watercourses traversing the eastern portion of the project area and no development is allowed to take place within the buffer zones.

Although the project area scored a moderate to low current PES values, the current Ecological Importance and Sensitivity (EIS) of the area is still classified as Class B (high) as the eastern portion of the project area and surrounding undeveloped area to the north is still viewed as being of relatively high conservational significance for ecological functionality persistence in support of the surrounding ecosystem and water catchment and drainage area associated with the CBA 1.

Although no Red Data Listed-, or nationally protected species were found to be present, a number of provincially protected species are present within the eastern portion of the project area. It is therefore assumed that the entire project area and surrounding undeveloped landscape would historically probably have housed numerous provincially protected bulbous and other forb species associated with the relevant vegetation type.

Due to the presence of existing residential infrastructure, the undeveloped landscape to the west and north is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. The project area and surrounding landscape does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map) and no important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes.

It is the opinion of the specialist that the the virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the western/central portion of the project area is irreversible. Sufficient ecological restoration of the relevant vegetation type will therefore not be feasible. The identified significant ecological impact associated with the impeding and contamination of the drainage line to the west and the two significant ephemeral watercourses associated with the CBA 1 can be suitably managed and mitigated to prevent further significant negative impact. Adequate and unimpeded drainage and flow of surface water runoff from the project area towards the Brak River to the south is imperative for the continued ecological functionality of the CBA 1.

As the project commenced prior to the development of the NCSBP, the project does not necessarily warrant the requirement of an offset area to be identified and assessed (due to the impact on the CBA 1) or for project operations to be completely ceased. The project operations should be allowed to continue but all recommended mitigations measures as per this ecological report must be adequately implemented and managed for the remainder of the operational phase. All necessary authorisations and permits must also be obtained as soon as reasonably and practicably possible. The project should therefore be considered by the competent authority for Environmental Authorisation and approval.

11. References

Collins, N.B. 2017. Free State Province Biodiversity Plan: Technical Report v1.0. Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Internal Report.

Conservation of Agricultural Resources Act (Act 43 of 1983)

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

National Environmental Management Act (Act 107 of 1998)

National Environmental Management: Biodiversity Act (Act 10 of 2004)

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

National Forests Act (Act 84 of 1998)

National Water Act (Act 36 of 1998)

Northern Cape Nature Conservation Act (Act 9 of 2009)

Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP)
<http://bgis.sanbi.org/Projects/Detail/203>

South African National Biodiversity Institute (2006-). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, <http://bgis.sanbi.org/SpatialDataset/Detail/18>, Version 2012.*

www.climate-data.org

12. Details of the Specialist

Adriaan Johannes Hendrikus Lamprecht (Pr.Sci.Nat)

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

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.
- 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.

2017

- Completion of a specialist ecological assessment and report for the proposed Phethogo Consulting filling station development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 132 kV CENTLEC Harvard transmission line development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed Zevenfontein filling station development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed Olifantsvlei Curro School development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed 23 ha Babereki Agricultural development project in Hartswater, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed Eikenhof Curro School development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed 40 ha CoGHSTA residential development project in Norvalspont, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed 9 ha CoGHSTA residential development project in Williston, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for the proposed 100 ha Musgrave residential and commercial development in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 15 ha BVI Engineering Waste Water Treatment Works and associated pipeline development project in Britstown, Northern Cape Province.
- Completion of a specialist ecological walkthrough assessment and report and relocation of provincially protected species *Eucomis autumnalis* individuals for the Bloemwater 33.6 km Brandkop Bypass water supply pipeline in Bloemfontein, Free State Province.
- Completion and execution of a Species Relocation and Re-establishment Plan for 13 individuals of the provincially protected species, *Eucomis autumnalis*, for the Bloemwater 33.6 km Brandkop Bypass water supply pipeline in Bloemfontein, Free State Province.
- Completion of a specialist ecological exemption letter for the proposed Siloam Crematorium development in Welkom, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 0.5 ha Vuna Afrika Agricultural feedmill pelletizing plant development project outside Wepener, Free State Province.

- Completion of a specialist ecological assessment and report for the proposed 0.4 ha Olympic Flame filling station development project in Welkom, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 3000 ha agricultural development project outside Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed 46.04 ha University, Industrial and Residential development project in Orania, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 482 ha Piet Louw NEMA Section 24G agricultural development project outside Hopetown, Northern Cape Province.
- Completion of a specialist ecological assessment for a proposed 500 ha Wolfkop Valley Estate development project outside Bloemfontein, Free State Cape Province.
- Completion of a specialist Erosion and Rehabilitation Management Plan for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 4.1 ha Plot 31 Spitskop Residential development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 26.8 ha Oxidation Dam development project in Orania, Northern Cape Province.

2016

- Completion of a specialist ecological assessment and report for the proposed 3 km Olifantshoek Bulk Water Supply and reservoir development project in Olifantshoek, Northern Cape Province.
- Completion of two specialist ecological and wetland assessments and reports for the proposed respective 16 ha and 6 ha N8 highway gravel quarries development project near Ladybrand, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 100 ha De Eelt vineyard development project near Prieska, Northern Cape Province.
- Completion of two specialist ecological and wetland assessments and reports for the Lafarge cement production facility and quarry, respectively near Lichtenburg, North-West Province.
- Completion of a specialist ecological assessment and report for the proposed 12 ha Nooitgedacht Retirement Estate development project near Nelspruit, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for the proposed 42 km Ventersburg Bulk Water Supply and reservoir development project between Ventersburg and Riebeeckstad, Free State Province