

2019

# Postmasburg Ecological Assessment

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For the Postmasburg Multicomplex  
EndemicVision Environmental Services  
07 November 2019

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## Declaration of Consultant Independence

This report has been prepared by EndemicVision Environmental Services (EV) with the trading name of EndemicVision Environmental Services (Pty) Limited, with all reasonable skill, care and diligence within the terms of the contract with the client.

EndemicVision Environmental Services (Pty) Ltd is a multidisciplinary environmental management and consulting company with more than 10 years of successful industry work.

Chrizette Neethling has over 25 years of broad based environmental experience with more than 75 projects completed in mining, biodiversity and development industries. She has a strong background in environmental management systems, reactive regulatory tools to address development and the pro-active conservation tools to enhance projects.

As a qualified ecologist and environmentalist, she present strong supporting skills and experience in project management, biophysical closure planning and management, risk management, auditing and natural resource management. Her geographical area of expertise is the arid zones of Southern Africa and her qualification as a Nature Conservator and experience in this field provides her with a foundation of understanding the biophysical environment as a general ecologist.

### The following qualifications are relevant:

- Professional Registration: Ecological Scientist and Environmental Scientist: #40010417
- MSc – Biophysical Rehabilitation
- BSC –Honors (Cum Laude) Environmental Management
- BA with specialization in Environmental Management
- ND Nature Conservation Management
- NC Business Management

The author of this report, Chrizette Neethling, does hereby declare that she is an independent consultant on behalf of EV and has no business, financial, personal or other interest in the activity, application or appeal in respect of which she was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are her own.



**Signed: C.D. Neethling**

**Dated: 07 November 2019**

# 1 Report Outline

The report considers the infrastructure; baseline environment; trigger for specialist input and legal context as a starting point. The environment is described in terms of climate, geology and soils, vegetation context, fauna context, ecological sensitive areas that is supported by on-site verification of the baseline environment.

The report includes a description of the broad ecological characteristics of the site and its surrounds in terms of mapped spatial components of ecological processes and/or disturbance regimes, ecotones, buffering and ecological viability.

Ecological Assessment and Mitigation Management is presented as an assessment summary. The summary has been adapted to include vegetation type, habitat type and planned infrastructure with the assessment of significance. The degree to which impact can be reversed, cause irreplaceable loss and proposed mitigation measures are outlined for each of the areas with significant impact.

## 2 Introduction

EndemicVision Environmental Service Pty (Ltd) has been appointed as independent environmental consultants responsible for conducting the environmental impact assessment (EIA) required in support of the basic environmental impact assessment application for the development of the Postmasburg multi-purpose complex development.

This report provides the results of the desktop review, site visit and assessment of data towards indicating the flora, fauna and biodiversity impacts of the above-mentioned project.

The impact assessment is presented in the form of an environmental baseline, impact assessment, sensitivity map and mitigation plan.

## 3 Terms of Reference

The assessment is conducted according to the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as Environmental Impact Assessment Regulations 2014 - GNR 982 of 4 December 2014.

In support to the application of the regulation best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005) are also referred.

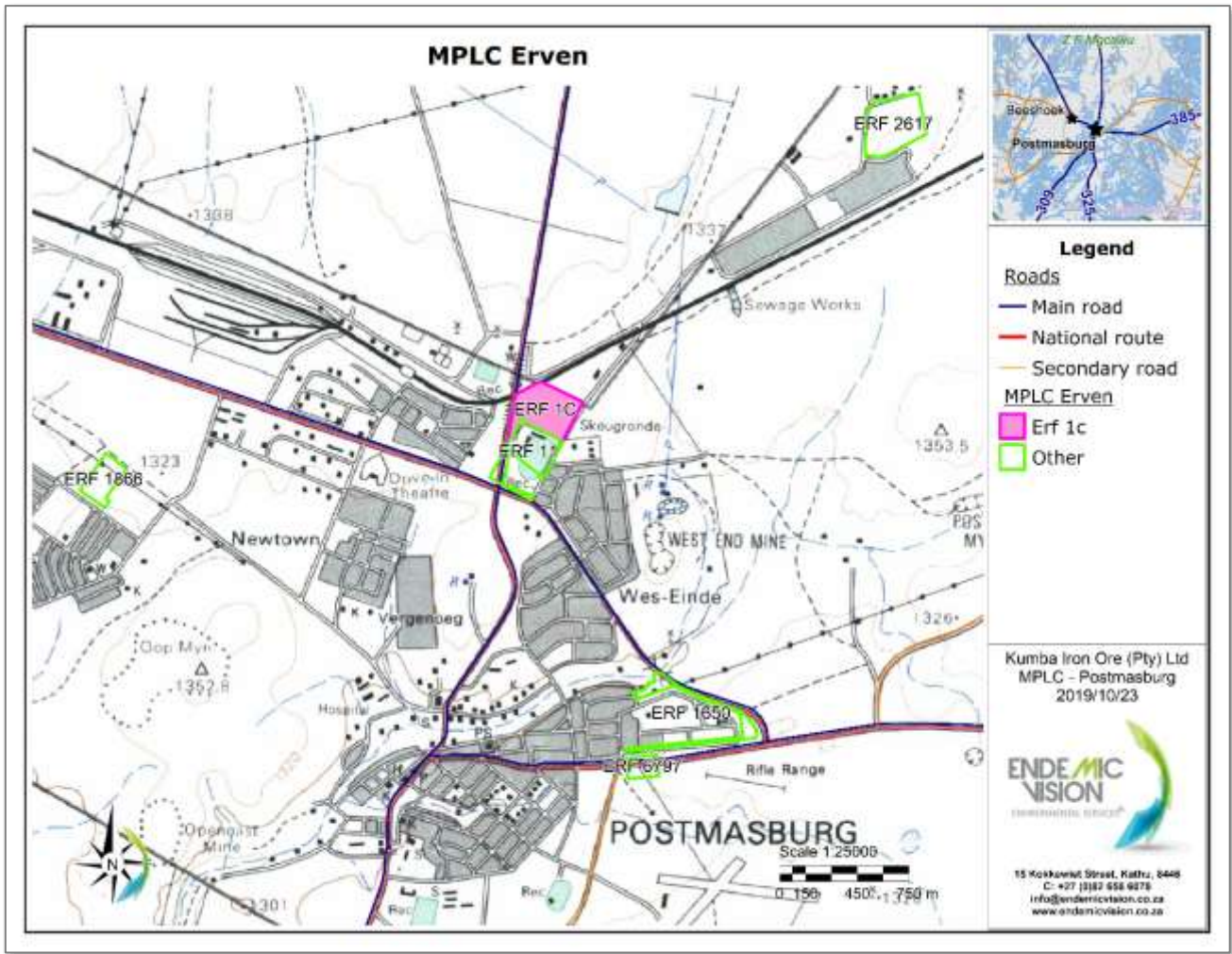
The Scope of Work (SoW) essential includes the following key activities:

- Site Evaluation;
- Data Verification and Analysis;
- Report Compilation;
- Client Input and finalisation;
- Final Report Submission

## 4 Project Orientation

Kumba Iron Ore (Pty) Ltd has initiated the process to ensure that their development activities are conducted effectively, legally and in the most efficient manner.

Kumba Iron Ore (Pty) Ltd is currently planning to develop the Multi-Purpose Lifestyle Complex on Erf 1 (part c) in Postmasburg. The Multi-Purpose Lifestyle Complex will support scarce category employee resources retention strategies for Kolomela Mine and enhance the quality of living of Postmasburg residents from a social, health and commercial perspective. Upgrade some of the existing parks and/or sports fields within Postmasburg Town will take place.



**Figure 1: Project location (erf 1c) and other erven upgraded as part town enhancement**

The Multi-Purpose Lifestyle Complex will be developed on Erf 1(c), Postmasburg, Northern Cape Province, Z F Mgcawu district municipality, Tsantsabane local municipality.

It covers an area of 8.15ha and is situated alongside the R325 as you enter Postmasburg Town. It is located approximately 250m North of the Sibilo Shopping Centre and just South of the Railway line that runs through the town.

The development will consist of the following infrastructure:

- Multi-Purpose Hall;
- Meeting Rooms;
- Offices;
- An after-school facility;
- An Arts & Culture Gallery;
- A Restaurant; and
- Boma.

Other erven within Postmasburg Town that will be upgraded as part of the MPLC Development include:

- Erf 11;
- Erf 2617;
- Erf 1650;
- Erf 1866; and
- Erf 6797.



Figure 2: Project design layout

## 5 Trigger for Specialist Input

In accordance with the Department of Environmental Affairs and Development Planning Guideline for Biodiversity specialists (Brownlie, S. 2005) the following evaluation was used to determine the need for a specialist study.

A 'trigger' means a characteristic of either the receiving environment or the proposed project which indicates that biodiversity is likely to be a 'key issue' and may require the involvement of an appropriately qualified and experienced specialist.

Table 1: Specialist study triggers evaluation

Site Trigger	Applicability to this project
A relatively undisturbed or 'natural' site, with indigenous vegetation	<b>APPLICABLE</b> The site has significant historic disturbance where development will take place, but the impacts occurred without authorisation and site is deemed natural.
Wetlands	<b>NOT APPLICABLE</b>
River systems	<b>NOT APPLICABLE</b>
Other possible significant natural feature	<b>NOT APPLICABLE</b> Individual protected species of significance were however found and is recorded as per legal requirement listed below.
Dune systems	<b>NOT APPLICABLE</b>
Legal Requirement in terms of biodiversity legislation	<b>APPLICABLE</b> This refers to legislation pertaining to the management of protected trees, protected fauna and flora and alien invasive species.
Lack of information about the receiving environment	<b>NOT APPLICABLE</b> This area is part of Griqua West Centre of Endemism planning domain and has habitat types generally known and previously investigated.
The presence of important biodiversity pattern	<b>NOT APPLICABLE</b> The site is isolated and fragmented within urban context.
The presence of important ecological processes	<b>NOT APPLICABLE</b>
The presence of important ecosystem goods and services;	<b>NOT APPLICABLE</b> The area serves as rubble dumping, walk through and communal grazing area.
The potential of the specific project to pose a threat to biodiversity;	<b>NOT APPLICABLE</b> The site is represented in terms of vegetation type, habitat and species composition. The general threat to biodiversity applies to the site, but specific biodiversity loss on regional scale is not applicable.
The potential of biodiversity and/or ecosystems to pose a threat to the proposed project	<b>NOT APPLICABLE</b> Access to the site is relatively easy, no human / environmental risk interfaces present.
The potential for making a significant contribution to biodiversity conservation objectives	<b>NOT APPLICABLE</b> The project has the potential to address biodiversity loss only in terms of certain protected specimens that can be replaced and enhancing the natural environment for human recreation.

## 6 Project Approach and Methods

Site evaluation work was conducted during October 2019.

The site was surveyed across the extent of the area and the directly adjacent landscape by traversing the area in a criss-cross manner of 10-meter bands.

Thereafter, in depth evaluation of flora; fauna; ecosystems were undertaken to gather the following information:

The flora baseline data set including baseline species list; species diversity and vegetation cover estimates evaluated by means of on-site assessment.

Fauna information was obtained by extrapolating data from the mammal sightings and indirect evidence (burrows, pellets and carcasses on site) was collected during the site assessment. Where appropriate, herpeto-fauna data will be incorporated using indirect data collection of available habitats and probable occurrence on site. All actual sighting's of fauna will be captured. Data will be compared with probable SIBIS and DENC lists for the area.

Evaluation of ecological processes witnessed on site and listing the habitat types assessed; vegetation types and unique habitats for fauna / avifauna interactions.

Projections of impacts on the habitat were assessed in-field during this site evaluation.

Species of special concern are presented according to the listing notices that dictate their protection. The listing notices of the following legislation were used to indicate species of special concern for this study:

- Nature and Environmental Conservation Ordinance (No. 19 of 1974) listing species as indigenous, protected or specially protected;
- National Forests Act (NFA 1998);
- National Management Biodiversity Act (2004) listing threatened or species and exotic species;
- The Red Data List of South African listing threatened plant species (i.e. critically endangered, endangered and vulnerable species).

Endemic species (range-restricted species) listed in any of the above or by the South African National Biodiversity Institute (2007) are also species of special concern as their distribution may be very localized and they could be threatened by developments.

Protected species, which are mostly geophytes and succulent species, have more specialised habitat requirements. The succulent species in particular are habitat specialists and occur in very specific closed and isolated habitat patches.

Species of special concern are listed in the tables below and the possibility, probability and definite occurrence of the species on the site indicated.

Data verification and analysis include the desktop review has been done by EndemicVision for other projects. The desktop reviews incorporated into the report include:

- All relevant topographical maps, aerial photographs and information (previous studies and environmental databases) related to the ecological components in the study area;
- Requirements regarding the fauna and flora survey as requested by the NC-DENC;
- Legislation pertaining to the fauna and flora study as relevant;
- Red data species list from the South African National Biodiversity Institute (SANBI);
- Historic ecological studies and impact assessments of the area.

Analysis is further taken forward to compile the impact statement as input to the EIA and provide management and mitigation measures for the protection of key biodiversity items.



## 7 Legal Overview

Legislation applicable to this project includes the following:

### 7.1 National Environmental Management Act (NEMA) (Act No 107, 1998):

NEMA requires that measures are taken to “prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

In this context ecological degradation could take place if the catchment area is permanently altered from a functional sensitive ecological state to a polluted, impacted site.

### 7.2 Environment Conservation Act (ECA) (No 73 of 1989 Amendment Notice No. R1183 of 1997)

ECA provides for the effective protection and controlled utilization of the environment. This Act has been largely repealed by NEMA, but certain provisions remain, in particular provisions relating to environmental impact assessments. The ECA requires that developers must undertake Environmental Impact Assessments (ESIA) for all projects listed as a Schedule 1 activity in the ESIA regulations.

### 7.3 National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004):

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Act provides for listing of species as threatened or protected, fewer than one of the following categories:

- Critically Endangered: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- Vulnerable: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

### 7.4 National Forests Act (No. 84 of 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: “no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated”.

In this context, the nationally protected species *Olea europaea* subsp. *africana* (Wild Olive), *Boscia albitrunca* (Witgat boom) and *Senegalia mellifera* (Camelthorn Tree) may apply.

### 7.5 Conservation of Agricultural Resources Act (Act 43 of 1983):

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilization of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the flood line of water courses and wetlands.

In this context, encroaching species in the form of *Vachellia melifera* were encountered and annual forb alien species were encountered. The alien forb species include, but is not limited to *Prosopis glandulosa*, *Amsinkia retrorsa*, *Bidens bipinnata*, *Nicotiana glauca*, *Pennesetum setaceae*.

### 7.6 Northern Cape Nature Conservation Act, No. 9 of 2009:

The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilization of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), Protected (schedule 2) to Common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under Schedule 1 or 2.

In this context some indigenous genus and protected species were found site and is included in the respective species lists.

## 8 Climatic Context

Most of the rainfall in this semi-arid region occurs in summer and early winter between the months of December and April. High summer temperatures cause atmospheric instability and turbulence, which leads to the development of thunderstorms.

The climate data was obtained from the New Local Climate Estimator, developed by the Food and Agricultural Organisation of the United Nations in 2005. Postmasburg occurs within a low rainfall area with a mean annual rainfall of approximately 374 mm. Rainfall is highly unpredictable with most rainfall occurring between November and April. The rainfall usually falls as a result of thunderstorms when tropical thunderstorm activity extends southwards over the Kalahari.

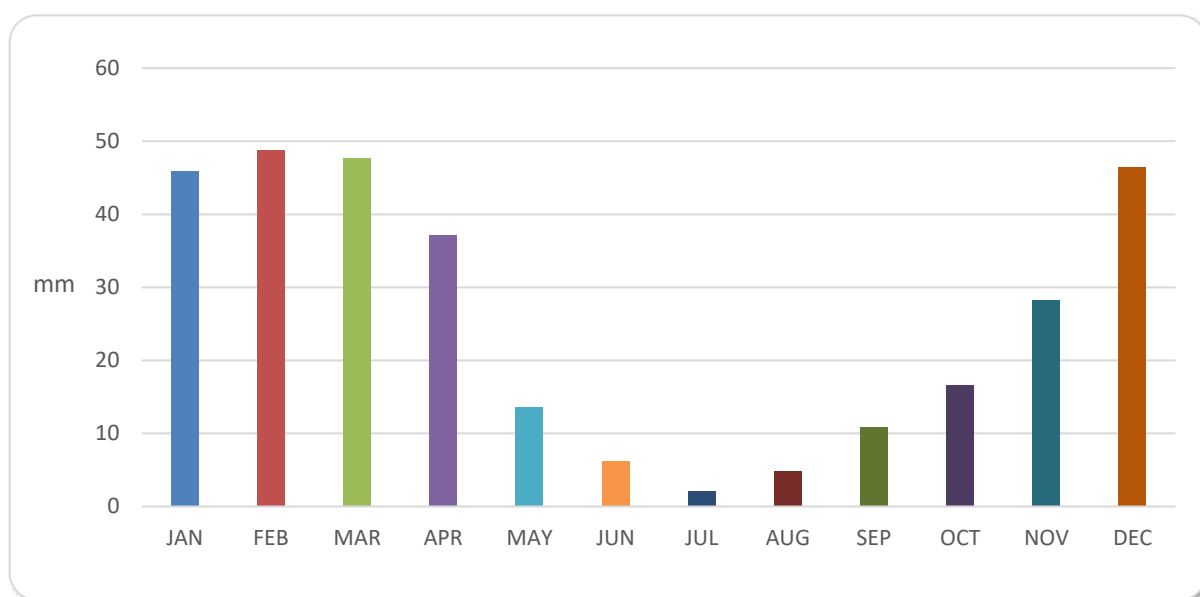


Figure 3: Rainfall statistics (Postmasburg Weather Station – 1917 to 1991)

Annual mean temperatures for Postmasburg is 17°C, with a minimum recorded of -8°C and a maximum of 38°C, based a five-year period.

No or very little rain falls between June and September, while evapo-transpiration is never less than 60mm per month. This implies that the area has a precipitation deficit of 1075mm per year and a moisture index of -75% and can therefore be classified as a dry region (semi-arid) for agricultural purposes.

Wind in the area has been recorded to blow at a maximum speed of up to 6.48 km/h in the summer there is an average of 9.8 to 10.1 sunshine hours per day and average day lengths of 12 to 14 hours.

## 9 Geology and Soils

The soils in the region are generally described to be desert soils and are mapped below (Map Source: Department of Agriculture technical services – Soils research institute). General description of soils is that it is red and dark with a high base status. Soils are shallow on rocky ridges or surface calcrete plates or sandy and freely drained on gentle to flat mid slopes. Mispah, Glenrosa, Namib and Coega soils are found and the Glenrosa and Mispah soil types dominate the area.

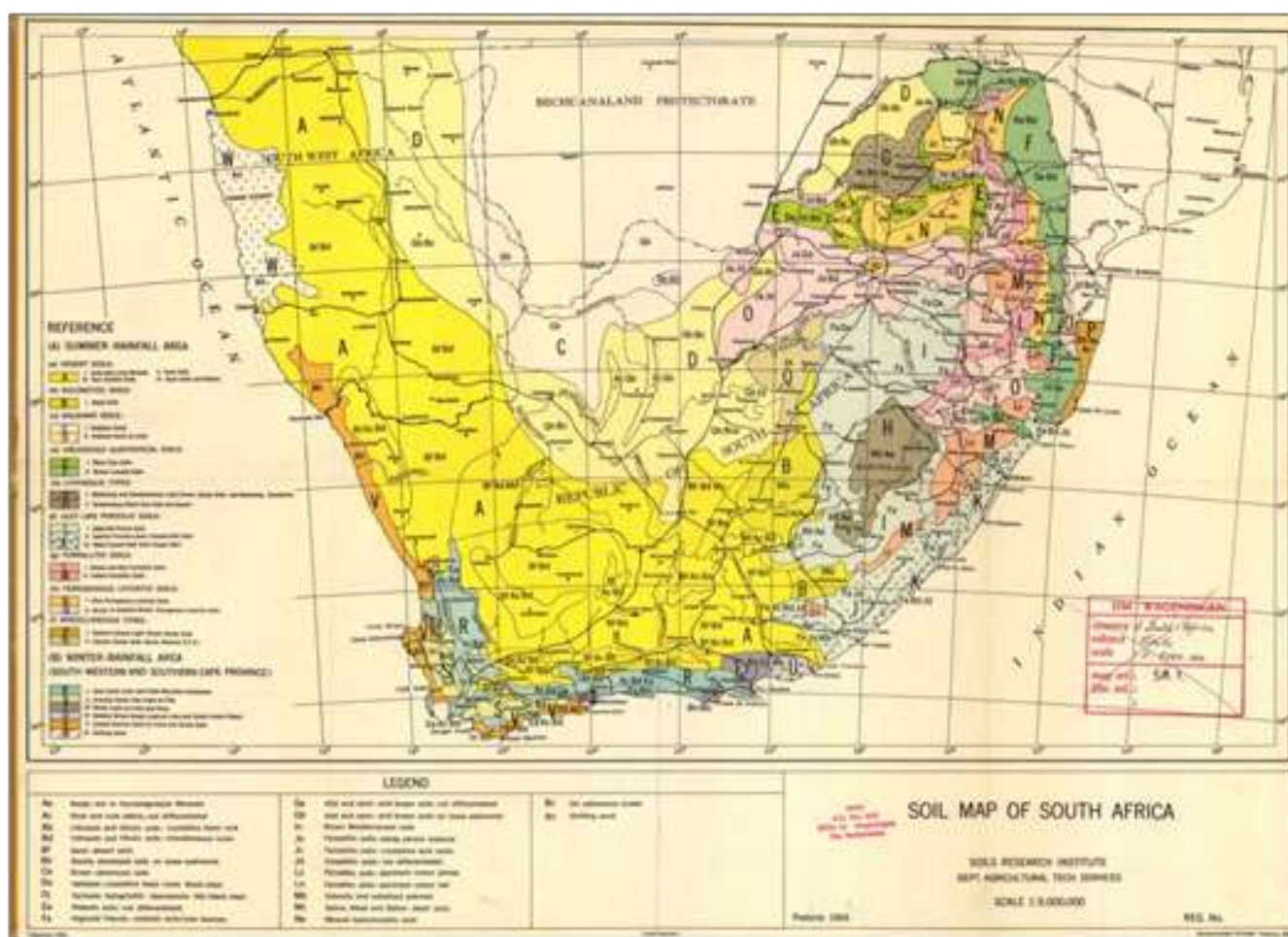


Figure 4: Soil Map indicating desert soils for the broader landscape

## 10 Flora

### 10.1 Vegetation types

The study area falls within the Eastern Kalahari Bushveld Bioregion of the Savanna Biome (Mucina & Rutherford 2006). This is seen as a relatively species-poor area. Less than 2.5% of the total species list of the southern Kalahari is regarded as endemic, while less than 6% of the plant species is regarded as near-endemic species (Van Rooyen & Van Rooyen 1998).

According to the most recent classification of Mucina & Rutherford (2011), one vegetation types occur on site.

The site is situated in Kuruman thornveld vegetation type between the railway; road and other residential and recreational erven.

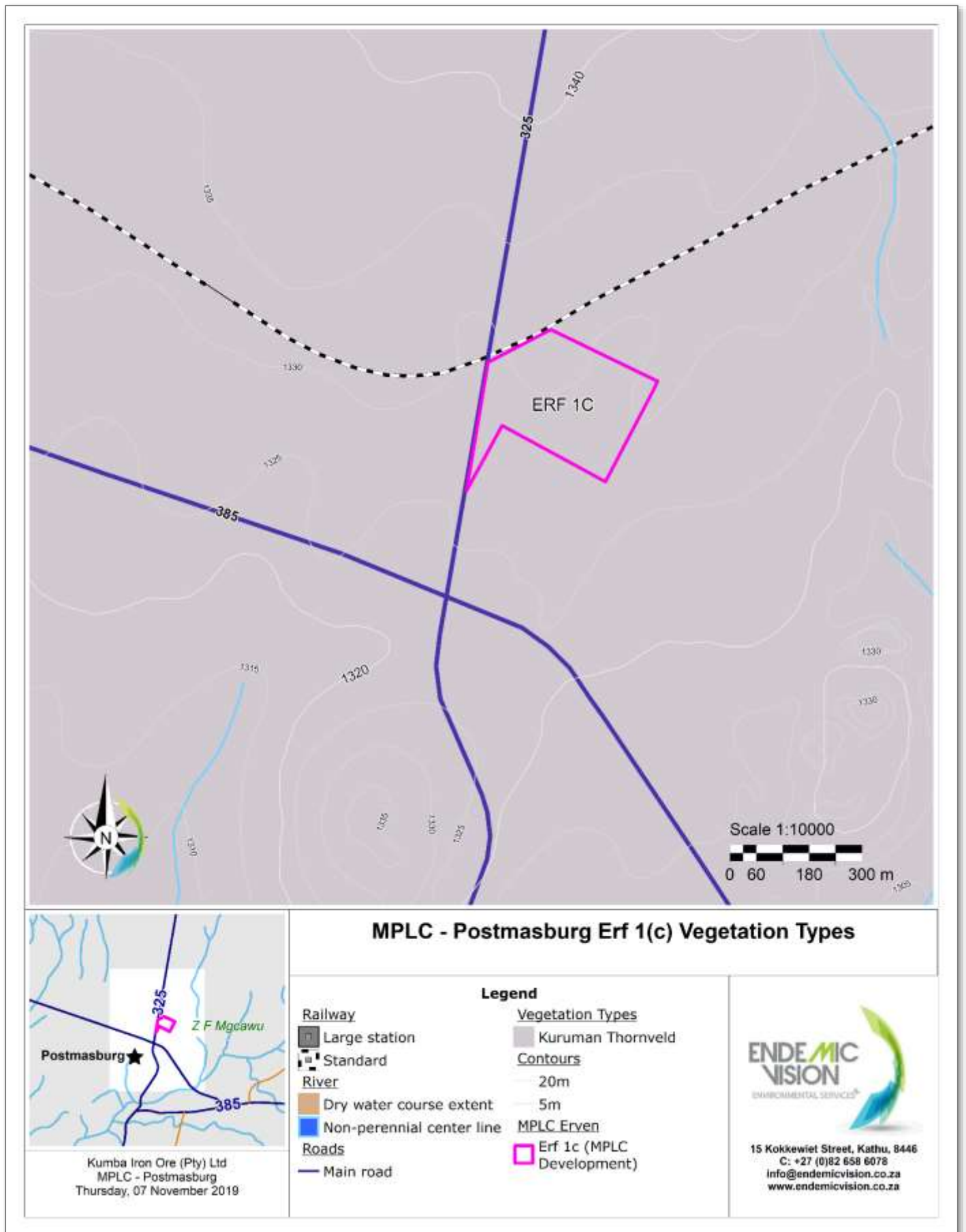


Figure 5: Vegetation Types (Mucina & Rutherford, 2011)

Kuruman thornveld is part of the Eastern Kalahari Bushveld Bioregion and occurs on flats from the vicinity of Postmasburg and Danielskuil (here west of the Kuruman Hills) in the south extending via Kuruman to Tsineng and Dewar in the north. This vegetation type is generally not eroding and approximately two percent have been destroyed (Mucina L. &, 2011).

**Table 2: Vegetation Status**

Vegetation unit	Extent (sq. km)	% area remaining	Biodiversity target (%)	Ecosystem status	Protection level (%)	Statutorily Conserved
Kuruman Thornveld	436052	98%	16%	Least threatened	Not protected	Not protected

## 10.2 Site vegetation

The veld condition was in poor condition due to littering, excessive trampling, alien species present, wood collecting, human activities and illegal dumping.

The site has undulating terrain of intact soils, subsoils, mounds and rubble heaps. Vegetation is primarily a thicket base of *V. mellifera*. Vegetation cover is estimated at 35:65 bare soil to vegetation.

The characteristic trees for this vegetation type are *Vallechia luederitzii*, *Boscia albitrunca* and *Searsia tenuinervis*. Of these, only one, *B albitrunca* was seen on site.

The site vegetation is dominated by *Senegalia mellifera* and in line with this vegetation type varies from an open to closed bushveld. Open areas are primarily because of rocky underlying material. Common large shrubs of this vegetation type include other small trees such as *Rhigozum obovatum*, *Rhus tridactyla* and *Ehretia rigida*. *Ziziphus mucronate*. Small shrubs are commonly recorded in the form of *Barleria rigida*, *Asparagus* species, *Dicoma capensis*, *Hermannia* species. Prevailing grasses are represented by *Stipagrostis uniplumis*, *Aristida congesta*, *Eragrostis lehmanniana* and *Fingerhuthia africana*.

The specific site has relatively good heterogeneity, indicating a relic of what the vegetation used to be before the numerous disturbances and ingress on the area. The vegetation community also seem to reflect why most of the site was demarcated as critical biodiversity area (SANBI, 2011).

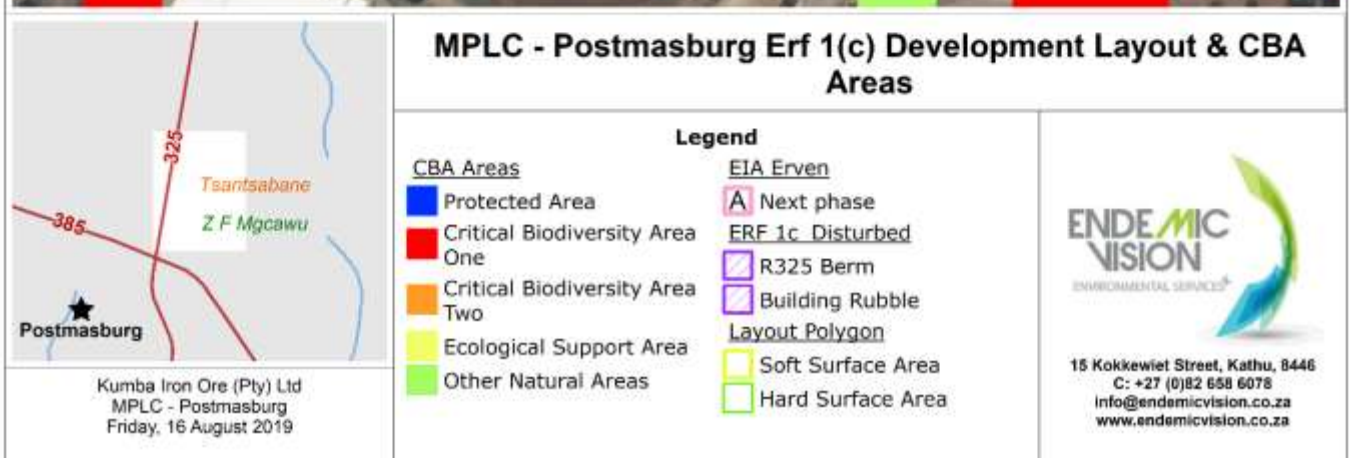


Figure 6: Critical biodiversity area mapping and project footprint overlay

The tall and low shrub component of the site can be considered marginally presenting the vegetation type where five of the twelve important species were found on site (*Ziziphus mucronate*; *Diospyros lycioides*; *Grewia flava*; *Rhigozum tridactyla*; *Lycium pilifolium*)

The grass component consists of pioneer, subclimax and climax grasses indicating that despite the disturbances good species were retained. Dominant grasses on site are *Cenchrus ciliaris*, *Stipagrostis uniplumis* and *Schmidtia pappophoroides*.

The alien plant species component of the vegetation profile consists of trees, shrubs, grasses and succulents. Alien spp are denoted in **red**. Protected species are denoted in **green**.

**Table 3: Flora observed on site with conservation status indicated**

<b>Vachellia erioloba</b>	<i>Helichrysum argyrosphaerum</i>
<i>Acacia hebeclada</i>	<i>Hermannia tomentosa</i>
<i>Senegalia mellifera</i>	<i>Heteropogon contortus</i>
<i>Aptosimum marlothii</i>	<b>Lebeckia macrantha</b>
<i>Aptosimum spinescens</i>	<i>Monechma incanum</i>
<i>Aristida congesta</i> subsp. <i>congesta</i>	<b>Pennisetum setaceum</b>
<i>Asparagus laricinus</i>	<i>Pollichia campestris</i>
<i>Asparagus bechuanicus</i>	<i>Pteronia glauca</i>
<i>Asparagus bechuanicus</i>	<i>Rhigozum trichotomum</i>
<i>Asparagus suaveolens</i>	<i>Schmidtia pappophoroides</i>
<b>Boscia albitrunca</b>	<i>Searsia burchellii</i>
<i>Cadaba aphylla</i>	<i>Searsia lancea</i>
<i>Cenchrus ciliaris</i>	<i>Searsia pendulina</i>
<i>Chrysocoma obtusata</i>	<b>Searsia tridactyla</b>
<i>Dicoma schinizii</i>	<i>Senna italica</i> subsp. <i>arachnoides</i>
<i>Diospyros lycioides</i> subsp. <i>lycioides</i>	<b>Sinus molle</b>
<i>Ehretia rigida</i>	<i>Solanum incanum</i>
<i>Enneapogon desvauxii</i>	<i>Stipagrostis uniplumis</i>
<i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i>	<i>Tarchonanthus camphoratus</i>
<i>Eragrostis echinochloidea</i>	<i>Waltheria indica</i>
<i>Eragrostis rigidior</i>	<i>Ziziphus mucronata</i> ssp. <i>mucronata</i>
<i>Eriocephalus africanus</i>	<i>Gymnosporia buxifolia</i>
<i>Eriocephalus merxmulleri</i>	<i>Gymnosporia szyszlowiczii</i>
<i>Gnidia polycephala</i>	<i>Lycium bosciifolium</i>
<i>Grewia flava</i>	<i>Lycium cinereum</i>
<i>Lycium pumilum</i>	<i>Albucca secunda</i>
<i>Felicia muricata</i>	<i>Albucca setosa</i>



Drimia sanguinea	Laggeria decurrens
Ledebouria spp	Oropetium capense
Ornithoglossum undulatum	Hermannia grandiflora
Pentzia calcarea	Melobium sp
Stipagrostis ciliata	<b>Prosopis glandulosa</b>
Chascanum pinnatifidum_pinnatifidum	Gazania krebsiana
Felicia muricata	Osteospermum pinnatum
Helichrysum arenicola	Salvia spp

### 10.3 Fauna

The site had droppings and spoor of species frequenting the area, primarily livestock (cattle, donkeys, horses, goats). Some evidence of gerbils and bird nests were also seen on site.

Mammal interaction on site is however limited because of the isolation, fragmentation and extensive impacts on the area.

## 11 Impact Assessment

### 11.1 Impact Assessment Approach

Standard evaluation methods are applied as defined below.

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on DEAT’s (1998) Guideline Document: EIA Regulations.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the potential impacts will be determined through a synthesis of the criteria below:

<b>Probability: This describes the likelihood of the impact actually occurring.</b>	
Improbable	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable	It is most likely that the impact will occur at some stage of the development.
Definite	The impact will take place regardless of any prevention plans.
<b>Duration: The lifetime of the impact.</b>	
Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term	The impact will last up to the end of the phases, where after it will be negated.
Long term	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

<b>Scale: The physical and spatial size of the impact.</b>	
Site	The impacted area extends only as far as the activity, e.g. footprint.
Local	The impact could affect the whole, or a measurable portion of the above-mentioned properties and adjacent properties.
Regional	The impact could affect the area including the neighbouring residential areas.
<b>Magnitude / Severity: Does the impact destroy the environment or alter its function.</b>	
Low	The impact alters the affected environment in such a way that natural processes are not affected.
Medium	The affected environment is altered, but functions and processes continue in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
<b>Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.</b>	
Negligible	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low	The impact is limited in extent, has low to medium intensity, whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate	The impact is of importance to one or more stakeholders, and its intensity will be medium or high, therefore, the impact may materially affect the decision, and management intervention will be required.
High	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels, and/or the cost of management intervention will be a significant factor in mitigation.

The following scale is used to determine the significance of the impact.

Aspect	Description	Weight	Significance Rating	Weight	Score Color
<b>Duration</b>	Short term	1	(Duration, Scale, Magnitude) x Probability		
	Medium term	3			
	Long term	4			
	Permanent	5			
<b>Scale/Extent</b>	Site	1	Negligible	<20	Grey
	Local	2			
	Regional	3			
<b>Magnitude/Severity</b>	Low	2	Low	<40	Green
	Medium	6			
	High	8			
<b>Probability</b>	Improbable	1	Moderate	<60	Orange
	Probable	2			
	Highly Probable	4			
	Definite	5			
<b>Probability</b>	Improbable	1	High	>60	Red
	Probable	2			
	Highly Probable	4			
	Definite	5			

## 11.2 Impact Statement

The following activities and project phases are presented as the impact statement for this project.

**Table 4: Project phases and activities that would result in environmental impacts**

Postmasburg Multi-Purpose Lifestyle Complex			
	Site Clearance	Construction	Operation
1	Clearing Indigenous Vegetation	Construction: earth works	Maintenance
2	Clearing Soils	Generation of Dust	Monitoring
3	Disturbance: Traffic	Rehabilitation	Operation of facility
4	Generation and accumulation of vegetation stockpiles		

**Table 5: List of activities with primary and secondary impacts**

Postmasburg Multi-Purpose Lifestyle Complex			
	Activity	Primary Impact	Secondary Impact
1	Clearing Indigenous Vegetation	Construction: earth works	
2	Clearing Soils	Generation of Dust	
3	Generation and accumulation of vegetation stockpiles	Rehabilitation	
4	Construction: earth works	Impact on traffic and transport networks. Generation and cumulation of waste.	Changes in air quality - dust
5	Operation of facility	Changes to municipal service delivery	Impact on traffic and transport networks
6	Rehabilitation	Restoration of soil functionality and production	Establishment of protected plant specimens
7	Maintenance and monitoring	Costs: Changes in land use value	Changes in social interaction with environment

### 11.3 Impact assessment results

Impact assessment details are tabled below and consider the specific impact during site clearance and operational phase.

Baseline risk, risk profile with mitigation measures in place as well as cumulative impacts is assessed. Positive impacts are highlighted in **green**. Positive impacts indicate how significant the positive impact is and the residual impact indicates to what degree the positive impact will not be achieved if the EMP and project is not implemented successfully.

**Table 6: Ecological and Environmental risk assessment results with initial score and residual risk profile**

	<b>Project Phase</b>	<b>Activity</b>	<b>Impact Description</b>	<b>Impact Type Degree of loss</b>	<b>Initial RISK Before mitigation</b>	<b>Final RISK Residual Impact</b>
1	Site Clearance	Clearing Indigenous Vegetation	Loss of protected plant specimens	Direct Negative Moderate	50	10
2	Site Clearance	Clearing Soils	Loss of topsoil	Direct Negative Moderate	70	28
3	Site Clearance	Generation and accumulation of vegetation stockpiles	Changes in soil functionality: loss of topsoil	Direct Negative Moderate	70	28
4	Construction	Construction: earth works	Impact on traffic and transport networks	Indirect Negative Low	45	45
5	Construction	Construction: earth works	Generation and cumulation of waste	Direct Negative Moderate	60	48
6	Construction	Construction: earth works	Changes in air quality-dust	Direct Negative Low	20	20
7	<b>Construction</b>	<b>Operation of facility</b>	<b>Changes to municipal service delivery</b>	<b>Direct Positive Moderate</b>	<b>75</b>	<b>15</b>
8	<b>Construction</b>	<b>Rehabilitation</b>	<b>Restoration of soil functionality and production</b>	<b>Direct Positive High</b>	<b>70</b>	<b>14</b>
9	<b>Operational</b>	<b>Maintenance and monitoring</b>	<b>Costs: Change in land use value</b>	<b>Direct Positive Moderate</b>	<b>75</b>	<b>15</b>
10	Operational	Operation of facility	Impact on traffic and transport networks	Indirect Negative Low	45	45
11	<b>Operational</b>	<b>Rehabilitation</b>	<b>Establishment of protected plants</b>	<b>Direct Positive High</b>	<b>70</b>	<b>15</b>
12	<b>Operational</b>	<b>Maintenance and monitoring</b>	<b>Changes in social interaction with environment</b>	<b>Direct Positive Moderate</b>	<b>75</b>	

The table below discuss each of the impacts assessed and provides context to the risk ratings provided.

**Table 7: Discussion of impacts assessed**

Impact Description	Discussion
Loss of protected plant specimens	The loss of a protected species will definitely be lost with a high probability that species will be replaced on site as part of the landscaping design.
Loss of topsoil	Topsoil must be stored on a previously disturbed area, retained and maintained with organic material for landscaping across the municipality.
Changes in soil functionality: loss of topsoil	Topsoil must be stored on a previously disturbed area, retained and maintained with organic material for landscaping across the municipality.
Impact on traffic and transport networks	Infrastructure impacts will occur to allow vehicle traffic to the site. No new roads or access areas are created and existing infrastructure will be used more frequently. The site is also not linking directly to any highway or key traffic lanes.
Generation and cumulation of waste	Without a municipal integrated waste management strategy to reallocate; re-use or recycle construction waste, cumulation of waste from this project is definite.
Changes in air quality - dust	Dust will occur and is more a construction, human nuisance issue than ecological impact on site.
<b>Changes to municipal service delivery</b>	<b>The current available nature areas, life style quality, environmentally healthy and recreationally stimulating areas in Postmasburg is very limiting, affecting the quality of life of all residents. This development will have a significant positive impact in the community.</b>
<b>Restoration of soil functionality and production</b>	<b>Topsoil must be stored on a previously disturbed area, retained and maintained with organic material for landscaping across the municipality.</b>
<b>Costs: Change in land use value</b>	<b>The current available nature areas, life style quality, environmentally healthy and recreationally stimulating areas in Postmasburg is very limiting, affecting the quality of life of all residents. This development will have a significant positive impact in the community.</b>
Impact on traffic and transport networks	Infrastructure impacts will occur to allow vehicle traffic to the site. No new roads or access areas are created and existing infrastructure will be used more frequently. The site is also not linking directly to any highway or key traffic lanes.
<b>Establishment of protected plants</b>	<b>Biodiversity value, protected species re-establishment and education opportunities are possible with successful rehabilitation/landscaping of the site</b>
<b>Changes in social interaction with environment</b>	<b>The current available nature areas, life style quality, environmentally healthy and recreationally stimulating areas in Postmasburg is very limiting, affecting the quality of life of all residents. This development will have a significant positive impact in the community.</b>

Cumulative impacts and impact creep are evident for most impacts. The question is more about accepting risk, than about having reduced cumulative impacts in the region where mining, agriculture and solar developments are effecting the natural environments cumulatively.

Cumulative impacts are presented below.

**Table 8: Cumulative impact results**

Impact Description	Cumulation Description	Cumulation RISK Significance
Loss of protected plant specimens	Cumulative tree specimen loss is a significant concern, especially with development expansions in prime distribution range of these species. Urban open space quality is increasing deteriorated where these specimens are not part of the urban context.	40
Loss of topsoil	Cumulative soil functionality depletion is directly related to the topsoil management on site. Through mitigation, this should not be a cumulative risk.	28
Changes in soil functionality: loss of topsoil	Cumulative soil functionality depletion is directly related to the topsoil management on site. Through mitigation, this should not be a cumulative risk.	28
Impact on traffic and transport networks	Cumulative impacts from traffic is definite with general population increase and the community use of the facilities.	16
Generation and cumulation of waste	Cumulative impact on land use because of waste generation is definite and can only be addressed through strategic municipal wide measures.	52
Changes in air quality - dust		0
<b>Changes to municipal service delivery</b>	<b>Cumulative positive impacts could develop where other green areas use the screening process and procedures of this project to enhance other areas</b>	<b>28</b>
<b>Restoration of soil functionality and production</b>	<b>Cumulative soil functionality depletion is directly related to the topsoil management on site. Through mitigation, this should not be a cumulative risk 28</b>	<b>28</b>
<b>Cost: Change in land use value</b>	<b>Cumulative positive impacts could develop where other green areas use the screening process and procedures of this project to enhance other areas.</b>	<b>28</b>
Impact on traffic and transport networks	Cumulative impacts from traffic is definite with general population increase and the community use of the facilities.	16
<b>Establishment of protected plants</b>	<b>Cumulative positive impacts could develop where other green areas use the screening process and procedures of this project to enhance other areas.</b>	<b>28</b>

<b>Changes in social interaction with environment</b>	<b>Cumulative positive impacts could develop where other green areas use the screening process and procedures of this project to enhance other areas.</b>	<b>28</b>
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## 12 Mitigation Measures

The significance of the impacts is directly affected by the success of the mitigation measures implemented.

The following mitigation measures are proposed to ensure a reduced risk rating as reflected above. The main items that must be addressed is the:

**Search and rescue procedure** that must be compiled for the contractor and municipality before commencement. This procedure should tie in with existing nursery or landscaping plans. The search and rescue protocol and its implementation should make out part of the conditions of the environmental authorization and its compliance monitoring.

Formal **traffic management plan** must be in place for construction and operational phase.

Formal, documented **handover process** must be implemented without delay for the sustainability of the project.

The details of the mitigation measures and above plans are tabled below.

**Table 9: Mitigation measures**

<b>Environmental Management Objective</b>	<b>Avoidance Measures</b>	<b>Reduction Measures</b>	<b>Remedial Measures</b>	<b>Monitoring Measures</b>
<b>Ensure vegetation establishment as soon as possible after clearing.</b>	Demarcate all areas that require vegetation clearance to reduce footprint and peripheral damage.	Limit vegetation clearing to areas that will be impacted immediately.	Ensure all vegetation is stockpiled for re-use in rehabilitation and landscaping. Economically viable biomass should be sold / donated for fire wood to take pressure of other tree populations. Shrub material should be mulched for re-vegetation of the site.	Monitor survival rate of transplanted specimens. Monitoring should guide management and maintenance requirements.
<b>Ensure vegetation establishment as soon as possible after clearing.</b>	Limit vegetation clearance only to areas that will be immediately affected. The site is not allowed to be cleared in its entirety. This is to reduce soil / organic material loss as well as dust impacts.	Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained and search and rescue of all protected plants and plants that could survive transplantation.	Ensure concurrent vegetation establishment on cleared areas before next rain season.	
<b>Search, rescue, seed harvest and translocate indigenous vegetation.</b>	Demarcate all areas that require vegetation clearance to reduce footprint and peripheral damage. Avoid any large trees (indigenous or exotic) that could contribute to micro habitats for establishment of other plants.	A search and rescue, translocation procedure should be put in place detailing search, rescue and seed harvesting timeframes; species; temporary storage (in nursery); propagation (from seeds/ cuttings taken from site); and final relocation, maintenance and monitoring of transplanted specimens.	Exotic trees should be used as nursing area for indigenous trees. Once the indigenous trees are large enough, the exotic trees can be removed.	The search, rescue, translocation process should be monitored and documented for application at other future projects in the municipality or other municipalities.

<p><b>Limit dust impacts from traffic</b></p>	<p>Travel on demarcated roads only and apply dust suppressant or wetting agent to seal road surfaces.</p>	<p>Maintain speed limits to reduce dust on site and in area.</p>	<p>Dust impacts cannot be remediated.</p>	
<p><b>Operational Sustainability, Maintenance and monitoring</b></p>	<p>The municipality should commence resourcing the facility at the start of the initial engagement about this project to ensure successful handover and long term sustainability of the project. The resourcing plan must be submitted to the project team before construction commence. Sufficient resources, skills, experience and funds must be available to maintain the required monitoring and maintenance, data analysis and management of elements monitored throughout the project.</p>	<p>Local municipal authorities source internally and partner with local expertise to meet the required capacity and intensity of sustainable high quality operation and maintenance of the site.</p>	<p>Final as-build designs, operational manual, formal handover to competent persons and maintenance plans should be provided by the engineers to the municipality before final sign-off of completed infrastructure. A formal handover process must be documented and implemented without delay by either party within two months of construction completion (construction resources are off site) of the infrastructure. Where this process is delayed, the delaying party will become responsible for the items subject to vandalism or deterioration because of interim lack of ownership.</p>	<p>Operations and maintenance plans adhered for the site during operation and for the rehabilitated areas after operation has ceased.</p>
<p><b>Manage alien invasive species</b></p>	<p>Prevent and limit alien invasive species establishing on site by conducting concurrent rehabilitation and vegetating bare areas as soon as possible.</p>	<p>Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.</p>	<p>Reintroduce local indigenous seed and species during rehabilitation. Vegetate area with specimens rescued from site where possible. This should be done where areas were cleared and where alien species were removed.</p>	<p>Alien vegetation monitoring should be conducted one year after construction and at least every second year after alien vegetation clearance has been completed. The monitoring must lead to eradication measures.</p>
<p><b>Manage waste cumulation from project</b></p>	<p>Avoid generating excess waste by buying bulk (reduced packaging), opt for direct delivery of construction material. Using environmentally friendly alternatives where possible.</p>	<p>Waste management hierarchy, sort at source and separation at source should be implemented during construction and operation. Specific effort must be made to ensure sorted waste are directed to potential re-users and not dumped in unsorted waste sites without any benefit of the sorting process applied to site. A register must be kept of organisations / individuals contacted to redistribute sorted waste appropriately.</p>	<p>Emergency response equipment, training and procedures must be in place for hazardous (including hydrocarbon related) incidents and emergencies.</p>	<p>Hazardous material inventory, correlating to the waste generated from these materials, MSDS file and proof of final, legal deposition at a registered hazardous waste facility or temporary storage area must be on site for inspection at all times.</p>
<p><b>Manage traffic impacts in the area</b></p>	<p>All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and</p>	<p>If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.</p>	<p>A traffic management plan must be compiled, clearly indicating traffic zones, pedestrian zones, signage, emergency routes and alternative routes.</p>	<p>The success of the traffic management plan should be reviewed once within six months of operation. This</p>



	tortoises. All wildlife must be recorded and translocated. Wildlife rescue and translocation must be written into the search and rescue procedure.			information must be used to improve and update the traffic management plan.
<b>Manage interaction with fauna during construction</b>	Site access should be controlled and no unauthorized persons should be allowed onto the site.	The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.	Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.	
<b>Manage topsoil as soil, seedbank and organic matter resource</b>	Demarcate all areas that require soil clearance to reduce footprint and peripheral damage.	Topsoil must be stored on a previously disturbed area, retained and maintained with organic material for landscaping across the municipality. The location, depth of topsoil to rescue as important resource must be captured in the search and rescue procedure.	Stockpile all topsoil cleared and protect (demarcate, vegetate or netting) topsoil stockpiles for future use.	Topsoil soil samples should be taken to guide amelioration of these soils for landscaping use.
<b>Manage topsoil as soil, seedbank and organic matter resource</b>	The project site and loose material will not be exposed to rain resulting in excessive erosion, siltation and general disturbance down slope	Provide temporary stabilization of disturbed areas that are not actively under construction. Use dust abatement techniques on unpaved, un-vegetated surfaces to minimize windblown erosion.	Soils should be remediated to such an extent that it can be used as potting / planting soils for landscaping and revegetation. Soil remediation plan and process must be captured in the search and rescue procedure.	The search, rescue, translocation process should be monitored and documented for application at other future projects in the municipality or other municipalities.
<b>Protect indigenous vegetation</b>	An area management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland	Inspect vegetation for protected species and ensure search and rescue before vegetation clearance. Any nationally protected trees within close proximity of the development footprint to be identified as no-go areas or special permits obtained to remove the trees, meeting the obligations of such permits issued	The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas by excluding grazing and trampling while vegetation is establishing	
<b>To minimise destruction or degradation of flora and ensure legal compliance in this regard</b>	All indigenous species is retained as far as possible and where alien species are encountered they are removed.  The selection of laydown areas will consider already disturbed areas first.  Any nationally protected trees within close proximity of the development footprint to be identified as no-go areas.	Along areas with deep sandy soils the topsoil should be put aside and replaced after disturbance.	Given the hyper-arid nature of the area active re-vegetation of disturbed areas is not recommended on account of the very low success that is likely to result. It is rather recommended that adequate and appropriate surface preparation which will encourage natural regeneration of the vegetation and ensure long-term vegetation recovery is performed.	

	All construction staff should undergo an environmental induction from a suitably qualified person regarding the importance of footprint management.			
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