

The Upgrade of Road R63. Section 16 between N6 Bridge and the N2.

Vegetation Assessment.



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Prepared for: CES

On behalf of: SANRAL

Date : 6 October 2017



6 October 2017

DECLARATION OF INDEPENDENCE

I, Mark Hylton Marshall as duly authorised representative of Sandula Conservation cc, hereby confirm my independence (as well as that of Sandula Conservation cc. as a specialist and declare that neither I nor Sandula Conservation cc. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which CES was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Environmental Impact Assessment for the proposed upgrade of R63. I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.

A handwritten signature in black ink, appearing to read 'M. Marshall', is written over a horizontal line.

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EXECUTIVE SUMMARY

This report involves an in depth study of the important floral species within the study area with reference to the proposed upgrade of the existing road, R63. This will also include extracting materials from previously used borrowed pits and the excavation of new pits. It focuses on whether or not there are impacts which could affect (positive or negative) the floral component of the study area; and if so, what these impacts are; for example: habitat destruction. This report highlights the impacts and provides mitigating circumstances relevant to the impacts.

This study involves one continuous line of road. The results are then recorded and incorporated into the proposed development project and with this, the impacts were identified. The particular species presence, natural habitats were also taken into consideration when ascertaining the impacts. The individual habitats; for example: forest, grassland etc were taken into consideration when developing the impacts. Once the impacts were identified, they were critically looked at and evaluated against the following criteria : nature of the impact, extent of the impact, duration of the impact, intensity of the impact, consequence, probability of the occurrence, legal requirements, degree of confidence, significance, cumulative impacts, reversibility, irreplaceability. Once the evaluation of the impacts were completed, mitigating measures were studied and mentioned which may lower the impact to the floral component if the development was to proceed. Conclusions are provided at the end of the report.

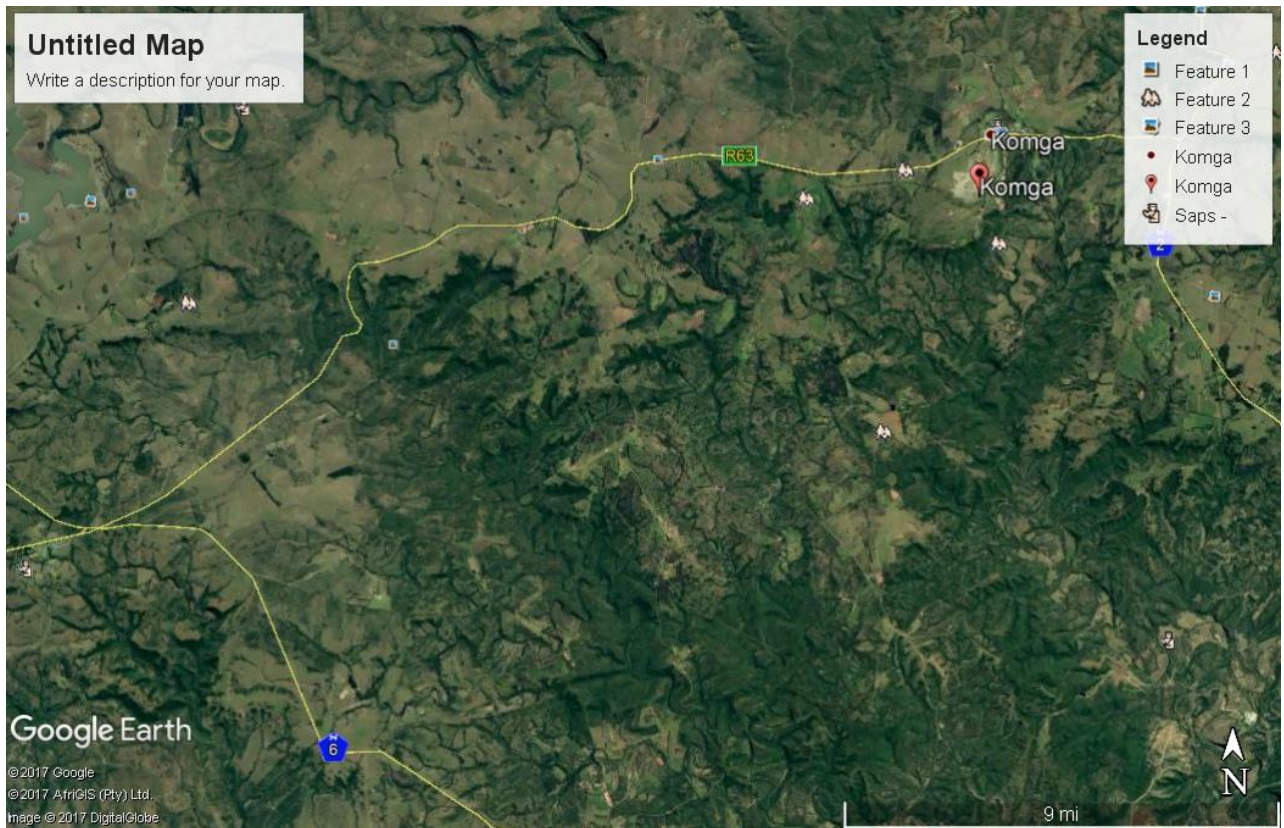


Figure 1: Proposed upgrade of R63, between the N6 Bridge and the N2

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED Upgrade of the R63 National Road

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1 INTRODUCTION

1.1 Background

The R63 is a road where the potential upgrade is proposed. This will incorporate the widening of the road. The widening of the road will expand the construction footprint of the road into the vegetation on the borders of the existing footprint. The project also comprises the opening of previously used borrowed pits and the opening of new pits to extract materials to use for the road upgrade. The study area is unique in that it comprises a linear road, accompanied by vegetation; which was previously existing; together with newly established vegetation on the edges of the road verge. In numerous places the vegetation has encroached into the road reserve. Alien invasive vegetation exists within this zone together with indigenous vegetation which has become invasive (*Acacia natalitia*). Planted trees have been placed next to the road as one enters the town of Komga. A residential property encroaches into the potential footprint of the development for approximately 50 meters. The impacts will be identified and addressed in terms of their significance and mitigation mentioned for each impact .

1.2 Study Approach

When one conducts a study of floral species together with development, the first aspect to focus on is the actual plant species which are present in the study area. Species lists are readily available but in terms of the study area in question, it is imperative to ascertain the actual individual floral species present within the study area, regarding their conservation status etc. (without this, the impacts cannot be identified).

The above helps to develop the relevant impacts in terms of the proposed development

Mitigation is dealt with after the impacts have been evaluated.

1.2.1 Ascertaining floral species presence within the study area

- Conduct drives along the R63 where one physically inspects the study area and records the floral species seen.
- The road was driven three times, regular stops were made where individual areas of potential importance were investigated.
- Text book study of the floral species within the study area.
- Plant community investigation; this involves identifying the individual plant communities and having a thorough knowledge of the floral component of the community.

1.2.2 Facts regarding the floral species

After determining the floral component of the study area one must study the following aspects of the species.

- The species relevant to each above category is then studied in terms of its status, ability to be relocated etc
- Were they naturally there, planted invasive etc
- Other factors such as fire, grazing, wood removal etc

1.2.3 Floral habitat

- The habitats must be looked at, are they randomly alone, forming part of a community, how large is the community, will it sustain itself if disturbed ?
- Topographical feature such as steep slopes, flat ground etc, this can determine the erosion effect on vegetation establishing after construction.

1.2.4 Impacts

- In terms of the above, the impacts are identified.
- The impacts are examined and rated.

1.2.5 Mitigation

The impacts are mitigated

2 DESCRIPTION OF AFFECTED ENVIRONMENT

The study area consists of various plant communities which have been existing, have materialized from the presence of agricultural practises, water presence, alien invasive vegetation, cattle/goat grazing and fire..

According to SANBI classification (Mucina and Rutherford,2006) two vegetation types occur within the R63 , namely :

- Amathola Montane Grassland
- Bhisho Thornveld

Amathola Montane Grassland

This vegetation forms part of the Grassland Biome. It is found on broken veld between Stutterheim and Komga at altitudes of 650-1500m. These grasslands are dominated by a variety of grasses, including *Themeda triandra*, *Elionurus muticus*, *Sporobolus africanus* and *Eragrostis chloromelas* etc.

Mucina and Rutherford (2006) classify Amathola Montane Grassland as having a least Threatened conservation status with a protection status of poorly protected. The NSBA conservation target for this vegetation type is 27 %.

Bhisho Thornveld

This vegetation falls under the Savanna Biome. It is found on the undulating to moderately steep slopes in large sections of the Eastern Cape. It is an open savanna characterised by small trees of *Acacia natalitia* with a short to medium dense, sour grassy understory, which is dominated by *Themeda triandra* when in good condition. Other woody components occur under overgrazing conditions.

Mucina and Rutherford (2006) classify the Bhisho Thornveld as least threatened with the protection status of hardly protected. The NSBA Conservation Target for this vegetation type is 25 %.

The floral component in relation to the vegetation (in this report) is described only in terms of the road verge and immediate surrounding habitat including the borrowed pits and quarries. The road verge consists of scattered trees growing either individually or in a mosaic pattern to only grasses to forest vegetation. There are a number of exotic/alien trees and one indigenous tree which has the potential of becoming invasive, namely: *Acacia natalitia*. The vegetation has been severely grazed by free roaming goats within the road reserve.

With reference to the proposed road widening, the study area has been divided and described in terms of the floral communities associated with the road layout/ potential construction footprint.



Figure 2: R63 road reserve, N2 side



Figure3: Settlement next to R 63

2.1 Plant Communities

In terms of the study area and in relation to the proposed construction, after looking at the habitats with their associated floral communities; for the purpose of this report it is necessary to divide the communities up into three, namely:

- Mosaic woodland
- Grassland
- Forest

2.1.1 Mosaic Woodland

This vegetation type exists of narrow strips along the borders of the road verge/reserve. They do not continue as a complete plant community extending from the road verges into adjacent land. Their existence/formation is due to farming practices of clearing vegetation in the past coupled with partial vegetation removal for the construction of the existing road. The floral community consists of *Acacia natalitia*, *Ingersia* spp. ; *Cussonia paniculata*; *Olea capensis*, and *Boscia oleoides*. Due to the road surface, water runoff from rains provide water for this community. This vegetation is referred as a Mosaic woodland due to its lack of canopy, lack of an ecotone, and the randomly scattered tree component. Small plant species have established within the road reserve such as *Crassula ovata* and *Pelargonium* sp. A main reason for the existence and protection of this plant community is the presence of a fence line which runs the entire side of the road. The Mosaic woodland community is represented (green) in Figure 9 below.



Figure 4: *Acacia natalitia*



Figure 5: *Cussonia paniculata* and *Acacia*



Figure 6: *Crassula ovata* within road reserve

2.1.2 Grassland community

This plant community consists mainly of grass species and a limited number small shrubs and weeds. There are no trees present in this community. The main grass component consists of: *Eragrostis* spp , *Aristida* spp, *Cynodon dactylon* . Other floral species found within the grassland are: *Leonotis ocymifolia*; *Taraxacum officinale* and *Senecio* spp. The grassland component is interrupted by the Mosaic woodland in certain places along the road side, this is represented (yellow) in Figure 9 below.



Figure: 7 Grassland near the N6 Bridge



Figure : 8: Grassland near the N2

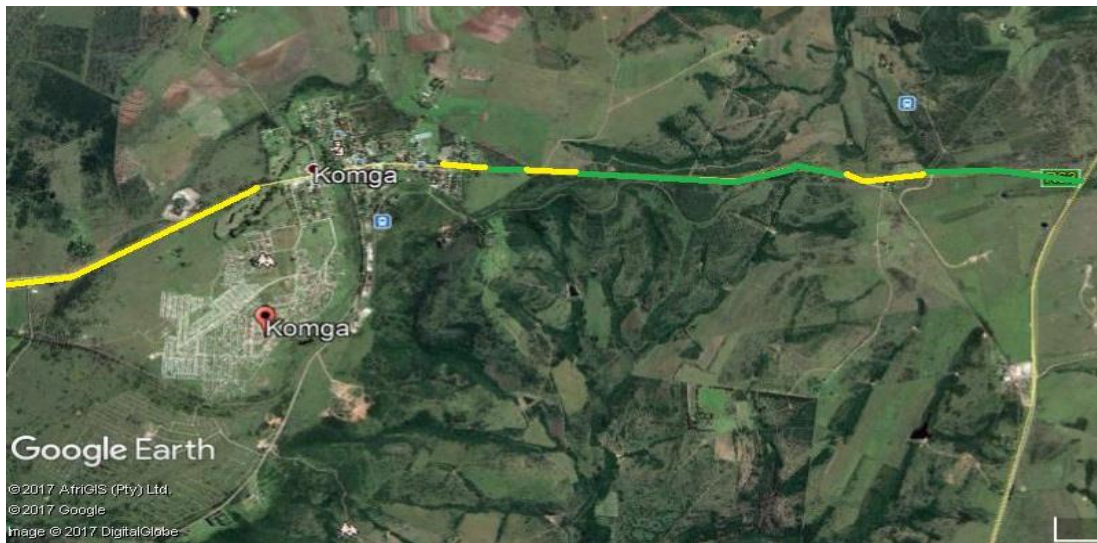


Figure 9: Mosaic and grassland representation along the R63

2.1.3 Forest

This community consists mainly of large trees. The former road traversed through an established forest, thus separating each floral section to function independently of each other. This is identified by the presence of an established ecotone on the edges of and within the road reserve. This vegetation community is continuous along the road verge and into adjacent land leading away (perpendicular) from the road. The ecotone species consist of: *Tecomaria capensis*, *Asparagus* sp, *Incersia andulata*, *Leonotis ocymifolia*. The dominant tree species are, *Acacia natalitia*, *Cussonia paniculata*, *Hippobromus pauciflorus*, *Rothmannia capensis*, *Zanthoxylum davyi*, *Olea capensis*, *Harpephyllum cafra*. The community is described as a forest because of the tree species present, the closed canopy in places, presence of an ecotone, presence of *Protasparagus* vines, and the extension of the community perpendicular to the road. The lack of *Portulacaria cafra*, *Azima tetraacantha*, *Euphorbia* species, and *Gasteria bicolor* which represent a thicket plant community. In certain parts of the road there are forest species established between *Eucalyptus* sp and *Pinus* woodlands. One can clearly see the boundaries of the forest in Figure 10 looking from the N2 towards the N6 Bridge. In terms of the entire study area; the forest occupies a minimal section of the road edges compares to the Mosaic woodland and grassy communities. This is represented in (red) Figure 13 below.



Figure 10: Visible forest seen from the N2 towards the N6 Bridge



Figure 11: The outer limits of the forest after the semi pass.



Figure12: The ecotone of the forest within the pass

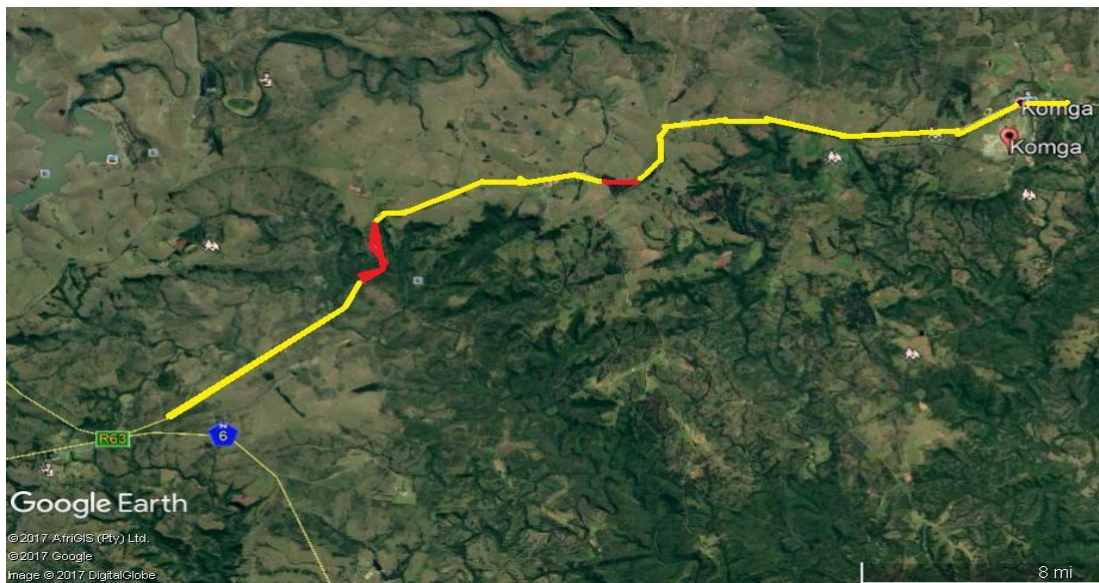


Figure 13: Representation of the forest community (red) within the development footprint

2.1.4 Borrowed pits and quarries

The borrowed pits and quarries, which will be excavated to use materials for the road construction, form part of the study area. All borrowed pits; except borrowed pit 25; and quarries are within close proximity to the road (R63). The potential of floral species being negatively impacted on during material transfer, from the pits etc to the road, is very low because of their proximity to the road. Access to borrowed pit 25 is provided by an existing farm road. Due to the fact that a number of the pits have previously been mined, and presently being used for cattle grazing, the vegetation component is low with only weeds, grasses and small shrubs present within these sites. The potential unused pits which will be used during the construction phase are currently being used for grazing which indicates that there is limited floral species except for grazing grasses. The borrowed pits and quarries are presently being used for cattle and goat grazing. They have been subjected to over grazing and frequent burning. The burning is usually the result of farmers encouraging fresh green grass growth for the livestock. This practise increases the grass component and decreases the component of plants of special concern etc.

Quarry 9

Quarry 9 is situated in close proximity to the N2. The floral component consists of grazing for cattle and goats (grasses), *Cynodon dactylon* being the dominant grass, there is a limited number of trees, mainly *Acacia natalitia*. There are no species of special concern nor protected floral species within the study area.



Figure 14: Vegetation of Quarry 9



Figure 15: Quarry 9, adjacent to the N2

Borrowed pit 23:

The vegetation of Borrowed pit 23 consists of grasses, small shrubs and weeds. There is a small water drainage line feeding water run-off from the road into the pit area, hence the healthier grass component near the water settlement and path areas. There are no species of special concern nor protected plant species within this study area.



Figure 16: grasses fed by water run-off into Borrowed pit 23



Figure 17: Borrowed pit 23.

Borrowed pit 26

Borrowed pit 26 consists of only grasses for cattle grazing together with a small water pan. The pan is fed from water run-off from the road. Scattered *Acacia natalitia* are present within the pit. There are no plant species of special concern or protected plant species within this study area.



Figure 18: Grass component of Borrowed pit 26



Figure 19: Borrowed pit 26, the pan is situated SW of the site.

Quarry 18

Quarry 18 is situated within grazing pastures (agricultural land). Due to the use of this land there are no species of special concern nor protected plant species within this site.



Figure 20: Quarry 18 within agricultural land

Borrowed pits 22, 25 and Quarry 11

The vegetation component of the three sites (BP22, BP25 and Q11) consists of open cattle grassing grassland. The vegetation is uniform throughout all three sites and there are no species of special concern nor protected plant species.

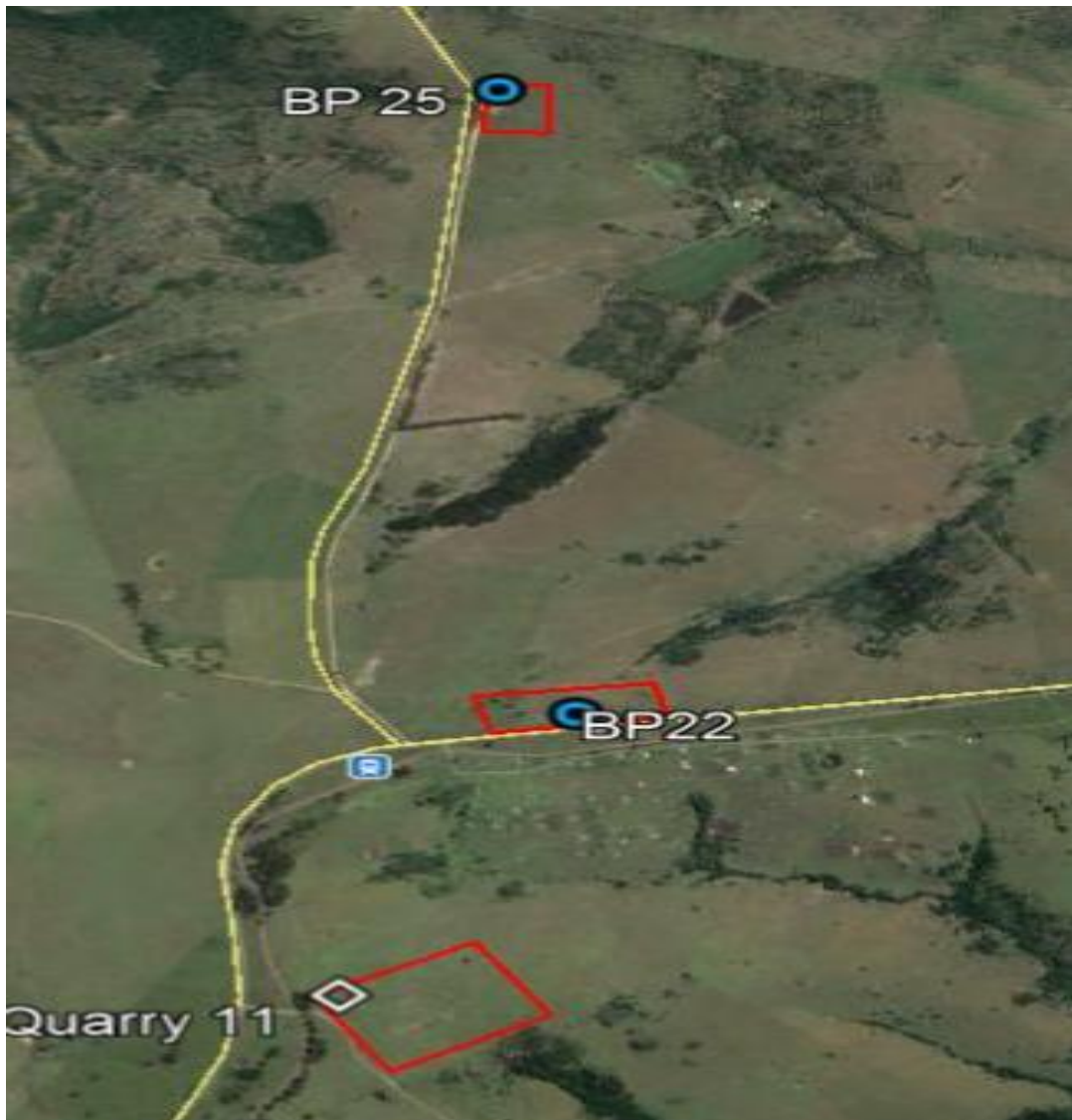


Figure 21: Borrowed pits 22, 25 and Quarry 11

Quarry 4

Quarry 4 was a previously used quarry which will be subjected to expansion during the road construction. The vegetation component consists of grasses and *Acacia natalitia*. This land has been subjected to fires in the past which has led to the encroachment of *Acacia natalitia*



Figure 22: Quarry 4: Previously used quarry

2.1.5 Alien vegetation

There is presence of a number of alien trees and plants within the study area. They have the potential of becoming invasive is not monitored and controlled. Below is a list of the alien trees and plants within the study area.

Table 1: Alien vegetation within the study area of R63.

Common name	Species
Black wattle	<i>Acacia mearnsii</i>
Red gum	<i>Eucalyptus camaldulensis</i>
Pine trees	<i>Pinus spp</i>
Flowering gum	<i>Eucalyptus ficifolius</i>
Prickly pear	<i>Opuntia sp</i>
Lantana	<i>Lantana camara</i>
Seringa berry	<i>Melia azedarach</i>
Beefwood	<i>Casuarina cunninghamiana</i>
Bramble	<i>Rubus cuneifolius</i>
Bug weed	<i>Solanum mauritianum</i>
Sesbania	<i>Sesbania punicea</i>

3 IMPACT IDENTIFICATION

The impacts are rated both before and after the proposed mitigation and management measures have been implemented. Impacts are rated for their full life cycle of the proposed development, including construction and operational phases. Impact rating has taken into account the cumulative effects of other activities occurring within the study area; the identified impacts are identified as:

- **Habitat destruction**
 - **Alteration of plant community**
 - **Establishment of alien invasive plant species**
-

3.1 Impacts

3.1.1 Habitat destruction

Description of impact:

The construction of roads, widening of existing roads, building of bridges; and site clearing will destroy existing habitats. The ecological floral corridor may be disturbed when permanent structures (road/gabions etc) are placed within a functioning corridor and this divides or separates the ecological corridor/habitat and interdependent operations of the ecosystem. The individual floral species within the proposed development site as a whole function according to their succession; sub/climax communities etc. Regarding a forest, the ecotone is the area which acts as a buffer against alien vegetation invasion, fire, wind, erosion etc, disturbing or removing this buffer will negatively affect the forest. The road presently exists between the forests but through the years the ecotone has re-established. The present road verges have stabilised and the ecotones are existing, by widening the road the development footprint will encroach into the forest community and destroy the ecotones, this disturbance will lead a negative impact for example: erosion will be encouraged which will disturb tree root anchorage. This impact involves the direct removal and destroying of floral species occurring within the development footprint. When constructing a road; the actual destruction will be wider than the proposed width, this is usually wider to accommodate traversing construction vehicles, delivery of materials etc. When constructing a road, the new road reserve may stretch further than the initial road design footprint. The same principle applies to the widening of an existing road. Habitat destruction leads to the destruction of flora

3.1.2 Alteration of plant community

Description of impact:

When one looks at construction, one often focuses on the destruction of habitats and often does not recognise the creation of habitats, nevertheless habitat creation in terms of the proposed construction may indirectly lead to other non representative indigenous floral species seeding and establishing in the area. Due to the unnatural

circumstances, these natural indigenous species may thrive and may become invasive which could invade the former plant community and alter it. Once pioneer plant species establish themselves in the fresh rehabilitated soil they provide secure shelter for the specific correct community plants to establish. If the incorrect plant species establish themselves first the correct plants will be compromised.

3.1.3 Establishment of alien invasive plant species

Description of impact:

When soils have been disturbed and are left exposed pioneer species and grasses begin to establish themselves. Alien weeds, such as *Lantana camara* establish faster than indigenous plants thus becoming invasive. Once established, the more woody alien species establish such as *Melia azedarach*. The presence of goats was noticed within the potential development footprint, these animals feed on the palatable plant species giving way for the alien species to grow. Table 1 above shows the alien species present within the study area, all these species have the potential to become invasive during construction and the operational phase of the project. Alien plant species are more resistant to fires and their seeds are often stimulated to germinate by fire.

4 IMPACT ASSESSMENT

The objective of the assessment of impacts is to assess all the significant impacts that may arise as a result of the road works.

In accordance with Government Notice R.385 of 2006, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the DEAT (April 1998), specialists will be required to describe and assess the potential impacts in terms of the following criteria:

(a) Nature of the impact

This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment. This description should include what will be affected and the manner in which the impact will manifest itself.

(b) Extent of the impact

The specialist must describe whether the impact will be: local (limited to the site and its immediate surroundings); or whether the impact will be at a regional or national scale. Where possible, a quantification of the extent (e.g. in hectares) of the impact should be given.

(c) Duration of the impact

The specialist must indicate whether the lifespan of the impact would be short-term (0-5 years), medium-term (6-10 years), long-term (>10 years) or permanent.

(d) Intensity

This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy an element of the environment, alter its functioning, or render it only slightly altered? The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.

(e) Consequence

The consequence of the potential impacts will be determined according to the main criteria for determining the consequence of impacts, namely the extent, duration and intensity of the impacts.

(f) Probability of occurrence

The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

(g) Legal requirements

The specialist should identify and list the relevant South African legislation and permit requirements pertaining to the development proposals. He/she should provide reference to the procedures required to obtain permits and describe whether the development proposals have the potential to or would definitely contravene the applicable legislation.

(h) Degree of confidence in predictions

The specialist must state the degree of confidence (low, medium or high) he/she has in the predictions made for each impact, based on the available information and level of knowledge and expertise.

(i) Significance

The overall significance of the impacts will be defined based on the result of a combination of the consequence rating and the probability rating, as defined above. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented or whether the resource is irreplaceable and/or the activity has an irreversible impact.

(j) Cumulative impacts

Incremental impacts of the activity and other past, present and future activities on a common resource.

(k) Reversibility

The ability of the impacted environment to return to its pre-impacted state once the cause of the impact has been removed.

(l) Irreplaceability

Would the activity have an impact on a resource / feature that is essentially irreplaceable?

(m) Mitigation measures

Appropriate mitigation measures in order to prevent an impact or to reduce its significance.

Table 2 below provides a summary of the criteria and the rating scales to be used. The assignment of ratings will be undertaken based on past experience of the EIA.

Subsequently, mitigation measures will be identified and considered for each impact.

The result of the above assessment methodology will be linked to authority decision-making by authorities in the following manner:

- Low – will not have an influence on the decision to proceed with the proposed project, provided that recommended mitigation measures to mitigate impacts are implemented;
- Medium – should influence the decision to proceed with the proposed project, provided that recommended measures to mitigate impacts are implemented; and
- High – would strongly influence the decision to proceed with the proposed project regardless of mitigation measures.

Table 2: Impact assessment criteria and rating scales

Criteria	Rating Scales
<p>Cumulative impacts (incremental impacts of the activity and other past, present and future activities on a common resource)</p>	<ul style="list-style-type: none"> • Low (there is significant capacity of the environmental resources within the geographic area to respond to change and withstand further stress) • Medium (the capacity of the environmental resources within the geographic area to respond to change and withstand further stress is reduced) • High (the capacity of the environmental resources within the geographic area to respond to change and withstand further stress has been or is close to being exceeded)
<p>Nature</p>	<ul style="list-style-type: none"> • Positive • Negative • Neutral
<p>Extent (the spatial limit of the impact)</p>	<ul style="list-style-type: none"> • Local (site-specific and/or immediate surrounding areas) • Regional (provincial) • National or beyond
<p>Intensity (the severity of the impact)</p>	<ul style="list-style-type: none"> • Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected) • Medium (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected) • High (where natural, cultural or social functions and processes are altered to the extent that the impact will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected)
<p>Duration (the predicted lifetime of the impact)</p>	<ul style="list-style-type: none"> • Short-term (0 to 5 years) • Medium term (6 to 15 years) • Long term (16 to 30 years where the impact will cease after the operational life of the activity either because of natural processes or by human intervention) • Permanent
<p>Consequence (a combination of intensity, extent and duration)</p>	<ul style="list-style-type: none"> • High <ul style="list-style-type: none"> ○ High intensity at a regional level and endure in the long term ○ High intensity at a national level and endure in the medium term ○ Medium intensity at a national level and endure in the long term ○ High intensity at a regional level and endure in the medium term ○ High intensity at a national level and endure in the short term ○ Medium intensity at a national level and endure in the medium term ○ Low intensity at a national level and endure in the long term ○ High intensity at a local level and endure in the long term ○ Medium intensity at a regional level and endure in the long term • Medium <ul style="list-style-type: none"> ○ High intensity at a local level and endure in the medium term ○ Medium intensity at a regional level and endure in the

Criteria	Rating Scales
	<p>medium term</p> <ul style="list-style-type: none"> o High intensity at a regional level and endure in the short term o Medium intensity at a national level and endure in the short term o Medium intensity at a local level and endure in the medium term o Medium intensity at a local level and endure in the long term o Low intensity at a national level and endure in the medium term o Low intensity at a regional level and endure in the long term <p>• Low</p> <ul style="list-style-type: none"> o Low intensity at a regional level and endure in the medium term o Low intensity at a national level and endure in the short term o High intensity at a local level and endure in the short term o Medium intensity at a regional level and endure in the short term o Low intensity at a local level and endure in the long term o Low intensity at a local level and endure in the medium term o Low intensity at a regional level and endure in the short term o Low to medium intensity at a local level and endure in the short term
<p>Probability (the likelihood of the impact occurring)</p>	<ul style="list-style-type: none"> • Improbable (where the impact is unlikely to occur) • Possible (where the possibility of the impact occurring is very low) • Probable (where there is a good probability (< 50 % chance) that the impact will occur) • Highly probable (where it is most likely (50-90 % chance) that the impact will occur) • Definite (where the impact will occur regardless of any prevention) measures (> 90 % chance of occurring)

Criteria	Rating Scales
<p>Significance (the consequence of the impact occurring coupled with the likelihood of the impact occurring)</p>	<ul style="list-style-type: none"> • Insignificant <ul style="list-style-type: none"> ○ very low consequence and improbable ○ very low consequence and possible • Very Low <ul style="list-style-type: none"> ○ very low consequence and possible ○ very low consequence and definite ○ low consequence and improbable ○ low consequence and possible • Low <ul style="list-style-type: none"> ○ low consequence and possible ○ low consequence and definite ○ medium consequence and improbable ○ medium consequence and possible • Medium <ul style="list-style-type: none"> ○ medium consequence and possible ○ medium consequence and definite ○ high consequence and improbable • High <ul style="list-style-type: none"> ○ high consequence and possible ○ high consequence and definite ○ very high consequence and improbable • Very High <ul style="list-style-type: none"> ○ very high consequence and possible ○ very high consequence and improbable ○ very high consequence and possible
<p>Reversibility (ability of the impacted environment to return to its pre-impacted state once the cause of the impact has been removed)</p>	<ul style="list-style-type: none"> • Low (impacted natural, cultural or social functions and processes will return to their pre-impacted state within the short-term) • Medium (impacted natural, cultural or social functions and processes will return to their pre-impacted state within the medium to long term) • High (impacted natural, cultural or social functions and processes will be permanent).
<p>Impact on irreplaceable¹ resources (is an irreplaceable resource impacted upon)</p>	<ul style="list-style-type: none"> • Yes • No
<p>Confidence level (the specialist's degree of confidence in the predictions and/or the information on which it is based)</p>	<ul style="list-style-type: none"> • Low • Medium • High

4.1: Mosaic woodland

4.1.1: Habitat destruction

Table 3: Impact: Habitat destruction (Mosaic woodland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	Long term	Long term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Definite	Highly probable	Conducting of audits
operational	Highly probable	improbable	Conducting of audits
Legal requirements: constructional	DAFF, NEMA, Ord. 19 of 1974	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	High	High	Conducting of audits
operational	Low	Very low	Conducting of audits
Cumulative impacts: constructional	High	medium	Conducting of audits
operational	Medium	Low	Conducting of audits
Reversibility: constructional	High	High	Conducting of audits
operational	Medium	medium	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.1.2 Alteration of plant community (Mosaic woodland)

Table 4: Impact: Alteration of plant community (Mosaic woodland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conduction of audits
operational	negative	neutral	Conduction of audits
Extent of the impact: constructional	Local	Local	Conduction of audits
operational	Local	Local	Conduction of audits
Duration of the impact: constructional	Short term	Short term	Conduction of audits
operational	Long term	Long term	Conduction of audits
Intensity of the impact: constructional	Medium	Low	Conduction of audits
operational	Medium	Low	Conduction of audits
Consequence: constructional	Low	Low	Conduction of audits

operational	Low	Low	Conduction of audits
Probability of occurrence: constructional	possible	Improbable	Conduction of audits
operational	possible	improbable	Conduction of audits
Legal requirements: constructional		n/a	Conduction of audits
operational		n/a	Conduction of audits
Degree of confidence: constructional	High	High	Conduction of audits
operational	High	High	Conduction of audits
Significance: constructional	Low	Very low	Conduction of audits
operational	Low	Very low	Conduction of audits
Cumulative impacts: constructional	medium	Low	Conduction of audits
operational	Medium	Low	Conduction of audits
Reversibility: constructional	Medium	Low	Conduction of audits
operational	Medium	Low	Conduction of audits
Irreplaceability: constructional	No	n/a	Conduction of audits
operational	No	n/a	Conduction of audits
Mitigation hierarchy			Avoidance

4.1.3 Establishment of Alien invasive plant species (Mosaic woodland)

Table 5: Impact: Establishment of alien invasive plant species (Mosaic woodland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Highly probable	Probable	Conducting of audits
operational	Highly Probable	Possible	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	Medium	low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.2 Grassland

4.2.1 Habitat destruction (Grassland)

Table 6: Impact: Habitat destruction (Grassland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	short term	Conducting of audits
operational	Medium term	short term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Probable	possible	Conducting of audits
operational	Probable	improbable	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	Low	Conducting of audits
operational	Medium	Very low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Reversibility: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.2.2 Alteration of plant community (Grassland)

Table 7: Impact: Alteration of plant community (Grassland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	Short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Probability of occurrence: constructional	Highly probable	possible	Conducting of audits
operational	possible	improbable	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits

Significance: constructional	Low	Very low	Conducting of audits
operational	Low	Very low	Conducting of audits
Cumulative impacts: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.2.3 Establishment of Alien invasive plant species (Grassland)

Table 8: Impact: Establishment of Alien invasive plant species (Grassland)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	Short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Highly probable	Probable	Conducting of audits
operational	Probable	Probable	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974 CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	Medium	low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.3 Forest

4.3.1 Habitat destruction: Forest

Table 9: Impact: Habitat destruction (Forest)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits

Duration of the impact: constructional	Long term	Medium term	Conducting of audits
operational	Long term	Medium term	Conducting of audits
Intensity of the impact: constructional	High	Medium	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Definite	Highly probable	Conducting of audits
operational	Highly probable	improbable	Conducting of audits
Legal requirements: constructional	DAFF, NEMA, Ord. 19 of 1974	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	High	High	Conducting of audits
operational	Low	Very low	Conducting of audits
Cumulative impacts: constructional	High	medium	Conducting of audits
operational	Medium	Low	Conducting of audits
Reversibility: constructional	High	High	Conducting of audits
operational	Medium	medium	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.3.2 Alteration of plant community (Forest)

Table 10: Impact: Alteration of plant community (Forest)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	Medium term	Short term	Conducting of audits
operational	Medium	Medium term	Conducting of audits
Intensity of the impact: constructional	medium	Low	Conducting of audits
operational	medium	Low	Conducting of audits
Consequence: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Probability of occurrence: constructional	possible	Improbable	Conducting of audits
operational	possible	improbable	Conducting of audits
Legal requirements: constructional	DAFF, NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Low	Very low	Conducting of audits
operational	Low	Very low	Conducting of audits
Cumulative impacts: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits

Mitigation hierarchy			Avoidance
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4.3.3 Establishment of Alien invasive plant species (Forest)

Table 11: Impact: Establishment of alien invasive plants (Forest)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Highly probable	Probable	Conducting of audits
operational	Highly Probable	Possible	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	Medium	low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.4 Borrowed Pits and Quarries

4.4.1 Habitat destruction

Table 12: Impact: Habitat Destruction (borrowed pits and Quarries)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits

Intensity of the impact: constructional	Low	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Probable	possible	Conducting of audits
operational	Possible	improbable	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	low	Very low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.4.2: Alteration of plant community

Table 13: Impact: Alteration of plant community (Borrowed pits and quarries)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Highly probable	Probable	Conducting of audits
operational	Probable	Possible	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	low	Very low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

4.4.3 Establishment of alien invasive plants

Table 14: Impact: Establishment of alien invasive plants (Borrowed pits and Quarries)

Criteria	Rating before mitigation	Rating after implementation of mitigation	Mitigation enforcement
Nature of the impact: construction	negative	neutral	Conducting of audits
operational	negative	neutral	Conducting of audits
Extent of the impact: constructional	Local	Local	Conducting of audits
operational	Local	Local	Conducting of audits
Duration of the impact: constructional	short term	Short term	Conducting of audits
operational	Long term	Long term	Conducting of audits
Intensity of the impact: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Consequence: constructional	Medium	Low	Conducting of audits
operational	Medium	Low	Conducting of audits
Probability of occurrence: constructional	Definite	Highly Probable	Conducting of audits
operational	Highly Probable	Probable	Conducting of audits
Legal requirements: constructional	NEMA, Ord. 19 of 1974, CARA	n/a	Conducting of audits
operational	Same as above	n/a	Conducting of audits
Degree of confidence: constructional	High	High	Conducting of audits
operational	High	High	Conducting of audits
Significance: constructional	Medium	low	Conducting of audits
operational	Medium	low	Conducting of audits
Cumulative impacts: constructional	Medium	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Reversibility: constructional	Low	Low	Conducting of audits
operational	Low	Low	Conducting of audits
Irreplaceability: constructional	No	n/a	Conducting of audits
operational	No	n/a	Conducting of audits
Mitigation hierarchy			Avoidance

5 MITIGATION MEASURES

5.1 Degree of mitigation:

The mitigation measures will reduce the impacts associated with the floral component in terms of the proposed road upgrade. The identified impacts have been discussed. Below is the explanation on what mitigation measures need to be in place and practised (constructional and operationally) to achieve the decreased impact.

- **Habitat destruction**
- **Alteration of plant community**
- **Establishment of Alien invasive plant species**

5.2 Recommended mitigation measures

Habitat destruction

Mitigation objective: The mitigations below will greatly reduce the effects of the impact if addressed in the Environmental Management Plan

Mitigating measures:

- Search and rescue operations conducted before construction phase begins. Seedling trees and small plant species such as *Crassula ovata* should be relocated.
- Remove as little vegetation as possible to facilitate the construction work
- List the plant species before the construction commences and replace these species after the road has been constructed.
- It is recommended to plant pioneer species first to stabilise the ground and provide protection for the sub and climax community plants to grow
- Stockpile top soil from the development footprint to be reused after the construction of the road; this top soil hold seeds from the plant community.
- Evenly distribute the topsoil in areas after construction
- Put in measures to prevent soil erosion and soil loss thus allowing a suitable surface/medium for plants to stabilise themselves
- Plant soil stabilising plants such as *Carpobrotus* to help stabilise the soil and prevent erosion or loss of soil to secure plant root germination
- Provide measures to keep livestock from grazing and browsing in the rehabilitated area.
- Rehabilitation should be conducted

Alteration of plant community

Mitigation objective: The mitigations below will greatly reduce the effects of the impact if addressed in the Environmental Management Plan.

Mitigating measures:

- List the plant species before the construction commences and replace these species after the road has been constructed.
- It is recommended to plant pioneer species first to stabilise the ground and provide protection for the sub and climax community plants to grow

- Use plant growth encouraging gabions; these gabions are fitted with substrate allowing plants to germinate in.
- Rehabilitate only with plant species from the area
- Conduct bi-annual audits to see if any species are invading/encroaching
- After the audit, remove any invasive species
- Live stock such as goats are selective grazers and will feed on the palatable plants, thus depleting them; leaving non palatable plants to invade
- Provide methods of keeping livestock from feeding in the rehabilitated zone
- Brought in soil must be examined for any forms of alien weeds/seeds before it is used in the rehabilitation process.

Establishment of alien invasive plant species

Mitigation objective: The mitigations below will greatly reduce the effects of the impact if addressed in the Environmental Management Plan

Mitigating measures: Aliens

- Staff must be educated about the alien plant species in their area
- Routine road inspections must be conducted to guard against spillages from vehicles and trucks transporting grain seeds etc which may spill on the road and generate in the road reserve
- Remove any alien trees/plants within the immediate area of the construction footprint
- Implement an alien plant species monitoring programme
- Strictly monitor lay-by/stopping areas where people in vehicles may discard of fruit peels, pips/seeds etc which may germinate
- Provide rubbish bins in areas where vehicles may stop on the side of the road
- Do not use fire as a control measure for alien vegetation removal
- Kikuyu grass must not be used as a stabilising grass, seek out the indigenous grass species from that area and purchase seeds from registered seller
- Monitor for fires, fires stimulate alien seeds to germinate
- Brought in soil must be examined for any forms of alien weeds/seeds before it is used in the rehabilitation process.

6 CONCLUSIONS AND RECOMMENDATIONS

This report involved a study of the floral component species within the R63 Road study area with reference to the proposed road upgrade. It focused on the impacts derived from the proposed development. The impacts were identified as:

- **Habitat destruction**
- **Alteration of plant community**
- **Establishment of Alien invasive plant species**

After investigating the impacts and with the relevant mitigating measures, the following was attained:

6.1 Forest plant community

The impacts involved with reference to the proposed road upgrade are substantial, with proper mitigations, the impacts may be greatly reduced.

6.2 Scattered woodland mosaic plant community

The impacts involved with reference to the proposed road upgrade are medium, with proper mitigations, the impacts may be greatly reduced.

6.3 Grassland

The impacts involved with reference to the proposed road upgrade are medium, with proper mitigations, the impacts may be greatly reduced.

6.4 Borrowed pits and quarries

The impacts involved with reference to the proposed road upgrade are minimal, with proper mitigations, the impacts can be greatly reduced.

7 REFERENCES

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Appendix 1: Floral species occurring within the study area

Type of vegetation	Family	Genus	Species	Common name
Grasses				
	<i>Poaceae</i>	<i>Alloteropsis</i>	<i>semialata</i>	Black seed grass
	<i>Poaceae</i>	<i>Aristida</i>	<i>congesta</i>	Spreading three-awn
	<i>Poaceae</i>	<i>Aristida</i>	<i>bipartite</i>	Rolling grass
	<i>Poaceae</i>	<i>Aristida</i>	<i>junciformis</i>	Gongoni three awn
	<i>Poaceae</i>	<i>Brachiaria</i>	<i>eruciformis</i>	Sweet signal grass
	<i>Poaceae</i>	<i>Brachiaria</i>	<i>serrata</i>	Velvet signal grass
	<i>Poaceae</i>	<i>Chloris</i>	<i>virgata</i>	Feather top Chloris
	<i>Poaceae</i>	<i>Cynodon</i>	<i>dactylon</i>	Couch grass
	<i>Poaceae</i>	<i>Dactyloctenium</i>	<i>australe</i>	LM Grass
	<i>Poaceae</i>	<i>Digitaria</i>	<i>eriantha</i>	Common finger grass
	<i>Poaceae</i>	<i>Digitaria</i>	<i>sanguinalis</i>	Crab finger grass
	<i>Poaceae</i>	<i>Digitaria</i>	<i>ternate</i>	Black seed finger grass
	<i>Poaceae</i>	<i>Eleusine</i>	<i>coracana</i>	Goose grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>capensis</i>	Heart seed love grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>cilianensis</i>	Stink love grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>chlormelas</i>	Curly leaf
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>curvula</i>	Weeping love grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>obtuse</i>	Dew grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>plana</i>	Tough love grass
	<i>Poaceae</i>	<i>Eragrostis</i>	<i>racemosa</i>	Narrow heart love grass
	<i>Poaceae</i>	<i>Festuca</i>	<i>scabra</i>	Munnik Fescue
	<i>Poaceae</i>	<i>Heteropogon</i>	<i>contortus</i>	Spear grass
	<i>Poaceae</i>	<i>Hyparrhenia</i>	<i>hirta</i>	Common thatching grass
	<i>Poaceae</i>	<i>Koeleria</i>	<i>capensis</i>	Koeleria
	<i>Poaceae</i>	<i>Melinis</i>	<i>nerviglumis</i>	Bristle-leaved red top
	<i>Poaceae</i>	<i>Melinis</i>	<i>repens</i>	Natal red top
	<i>Poaceae</i>	<i>Merxmuellera</i>	<i>stricta</i>	Cape wire grass
	<i>Poaceae</i>	<i>Panicum</i>	<i>deustum</i>	Broad leaved Panicum

	<i>Poaceae</i>	<i>Panicum</i>	<i>maximum</i>	Guinea grass
	<i>Poaceae</i>	<i>Panicum</i>	<i>schinzii</i>	Sweet grass
	<i>Poaceae</i>	<i>Paspalum</i>	<i>dilatatum</i>	Dallis grass
	<i>Poaceae</i>	<i>Paspalum</i>	<i>distichum</i>	Water Couch
	<i>Poaceae</i>	<i>Setaria</i>	<i>incrassate</i>	Vlei bristle grass
	<i>Poaceae</i>	<i>Setaria</i>	<i>lindenbergiana</i>	Mountain bristle grass
	<i>Poaceae</i>	<i>Sporobolus</i>	<i>fibriatums</i>	Drop seed grass
	<i>Poaceae</i>	<i>Tetrachne</i>	<i>dregei</i>	South african Cocksfoot
	<i>Poaceae</i>	<i>Themeda</i>	<i>triandra</i>	Red grass
Shrubs/forms	<i>Asteraceae</i>	<i>Taraxacum</i>	<i>Spp officinale</i>	Common Dandelion
	<i>Asteraceae</i>	<i>Senecio</i>		
	<i>Asparagus</i>	<i>Asparagus</i>	<i>aethipicus</i>	Sprenger's asparagus fern
	<i>Geranium</i>	<i>Pelargonium</i>		
	<i>Crassulaceae</i>	<i>Crassula</i>	<i>ovata</i>	
	<i>Senecia</i>	<i>sp</i>		
	<i>Bignoniaceae</i>	<i>Tecomaria</i>	<i>capensis</i>	
	<i>Lamiaceae</i>	<i>Leonotis</i>	<i>ocymifolia</i>	False dagga
Trees				
	<i>Mimosaceae</i>	<i>Acacia</i>	<i>natalitia</i>	Coastal Thorn
	<i>Capparaceae</i>	<i>Boscia</i>	<i>oleoides</i>	Sheppard's tree
	<i>Combretaceae</i>	<i>Combretum</i>	<i>kraussii</i>	Forest bushwillow
	<i>Araliaceae</i>	<i>Cussonia</i>	<i>paniculata;</i>	Cabbage tree
	<i>Anacardiaceae</i>	<i>Harpephyllum</i>	<i>cafrum</i>	Wild Plum
	<i>Sapindaceae</i>	<i>Hippobromus</i>	<i>pauciflorus</i>	False horse wood
	<i>Anacardiaceae</i>	<i>Incersia</i>	<i>andulata</i>	
	<i>Oleaceae</i>	<i>Olea</i>	<i>capensis</i>	White Iron wood
	<i>Rubiaceae</i>	<i>Rothmannia</i>	<i>capensis,</i>	Cape gardenia
	<i>Fabaceae</i>	<i>Erythrina</i>	<i>caffra</i>	Coral tree
	<i>Caesalpinaceae</i>	<i>Bauhinia</i>	<i>galpinii</i>	Pride of De Kaap
	<i>Rutaceae</i>	<i>Zanthoxylum</i>	<i>davyi</i>	Knob wood