FINAL
Ecological Impact Assessment

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

THE UPGRADING OF ROAD DR08035 BETWEEN MJANYANA HOSPITAL AND DR08034, CLARKEBURY, EASTERN CAPE.

DEDEAT REF: EC121&EC137/HO/LN1&3/M/-2-2019

FINAL ECOLOGICAL IMPACT ASSESSMENT

Prepared for:

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Consulting Engineers ▪ Civil and Electrical

Terreco Environmental cc

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CES Report Revision and Tracking Schedule

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	FINAL ECOLOGICAL IMPACT ASSESSMENT		

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THE PROJECT TEAM

1. (1) A specialist report prepared in terms of these Regulations must contain—
(a) details of—
(i) the specialist who prepared the report; and
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

Details of the specialist

Ms Rebekah Anderson
(Assistant report writer)
Rebekah is an Environmental Consultant and holds a B.Sc in Environmental Sciences with distinction, from Nelson Mandela University, majoring with Botany and Geography. Rebekah has her B.Sc honours in Environmental Management through UNISA, which she completed with distinction. Her Honours Thesis aims to determine the sustainability of tourism activities within a Botanical Garden, particularly the Kwelera National Botanical Garden. Rebekah has interned for CES from April 2018 and has gained experience in a number of fields. Particularly, Rebekah has worked on a number of Ecological Specialist studies during her time at EOH CES, namely; the SANRAL Road Upgrading of National Route N2 Section 5 between Lizmore and Heidelberg, the proposed development of the Waterval Citrus Farm and Great Kei Quarries desktop Ecological studies. Rebekah has also worked on an Aquatic study and a Soil and Agricultural assessment for the Heidelberg Road upgrade project.

Dr Greer Hawley
(Report reviewer)
Dr Greer Hawley has a BSc degree in Botany and Zoology and a BSc Honours in Botany from the University of Cape Town. She completed her PhD thesis (Microbiology) at Rhodes University. Greer has been involved in a number of diverse activities. The core academic focus has been in the field of taxonomy both in the plant and fungal kingdom. Greer's research ranges from fresh water and marine algae, estuarine diatoms, plant species classification in the fynbos and forest vegetation and fungal species identification and ecology. Greer has been involved in environmental and biodiversity impact assessments and environmental and biodiversity management projects both in South Africa and other African countries. Greer has recently assisted with the completion of the Eastern Cape Biodiversity Conservation Plan (2019), the Eastern Cape Biodiversity Strategy and Action Plan and assisted with the generation of the Western Cape State of the Coast Report. She is currently involved with finalising the Environmental Management Framework for the King Cetshwayo District Municipality.

Dr Alan Carter *Pri. Nat Sci.*
(Quality Control)
Alan is the executive of the EOH East London Office. He holds a PhD in Marine Biology and is a certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 25 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP by the Environmental Assessment Practitioners of South Africa (EAPSA).

Declaration

Role on Study Team	Declaration of independence
Report production	• I, Rebekah Anderson, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Report Reviewer	• I, Greer Hawley, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity;

	• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Report Final sign-off	• I, Alan Carter, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

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1. INTRODUCTION

1. (1) A specialist report prepared in terms of these Regulations must contain—
(c) an indication of the scope of, and the purpose for which, the report was prepared;
(cA) an indication of the quality and age of base data used for the specialist report;
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
(q) any other information requested by the competent authority.

1.1. Project description

The Eastern Cape Department of Transport proposes to upgrade a 20 km section of the DR08035 road from Clarkebury to the Mjanyana Hospital in the Eastern Cape (Figure 1.1). This will include the upgrade of bridges and culverts along the road. The aim of the road upgrade is to provide easy access to the hospital for villagers along the route of DR08035 from Clarkebury and surrounding areas.

The affected road portion is approximately 20 km long and 6-7m wide and will be upgraded from gravel to black top surface standards. The road upgrading activities will take the form of minimum mass earthworks for the improvement of existing vertical and horizontal alignments where necessary, additional pavement layers and seals. The upgrading action, in addition to the construction of the road pavement structure, will also include the installation of surface and subsurface drainage, traffic calming facilities, etc. This section of road will cross two major watercourses requiring upgrades to the bridge structures as well as numerous minor river crossings requiring culverts (Figure 1.2).

The proposed road upgrade will include the development of two 3.4m road lanes each with a road shoulder of 1.5m and a road reserve of 10m. The entire road portion will therefore be approximately 30m wide. The road upgrade will also include the use of three borrow pits, each below 5ha in size, and one quarry site that is approximately 7ha in size.

1.2. Project location

The project falls within the Chris Hani District Municipality (CHDM) and the Amathole District Municipality (ADM), and within two local municipalities; the Mbashe Local Municipality and the Engcobo Local Municipality. The project includes the use of various mining sites associated with the road upgrade

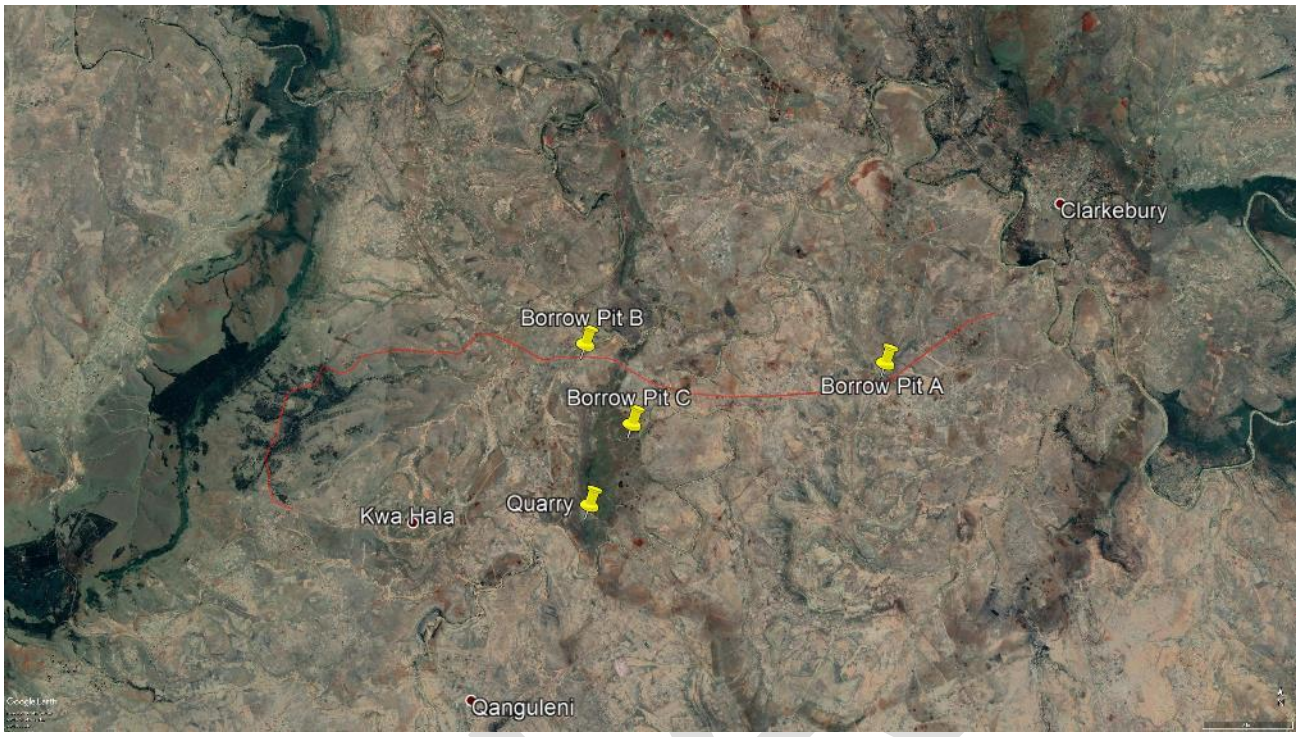


Figure 1.1: Location of the proposed road upgrade and associated borrow pits/ quarry sites.

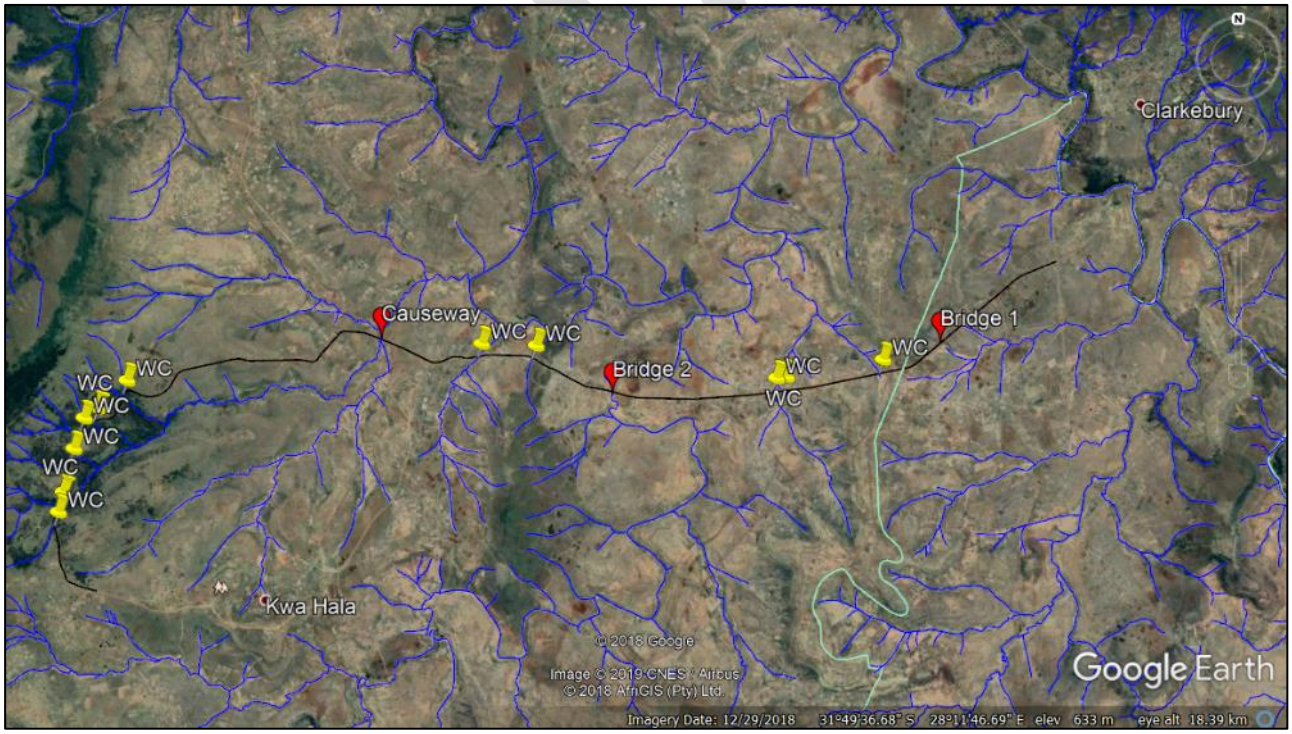


Figure 1.2 Location of water crossings along the road upgrade.

1.3. Alternatives

FUNDAMENTAL, INCREMENTAL AND NO-GO ALTERNATIVES

Fundamental alternatives

Fundamental alternatives are developments that are entirely different from the proposed project and usually include the following:

- Alternative property or location where it is proposed to undertake the activity (i.e. site alternatives);
- Alternative type of activity to be undertaken (i.e. land-use alternatives); and
- Alternative technology to be used in the activity (i.e. technical alternatives);

Incremental alternatives

Incremental alternatives relate to modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. The incremental alternatives that can be considered with respect to the current development project include:

- Alternative design; or
- Alternative layout of the activity.

No-go alternative

It is mandatory to consider the "no-go" option in the EIA process. The "no-go" alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). In the case of the current proposed development, the only "no-go" refers to **the road remaining in its current condition.**

Fundamental (Site) alternatives

No site alternatives have been assessed as the upgrade takes place on an existing district road. Therefore route/site alternatives are not deemed feasible.

Alternative	Description		Lat (DDMMSS)	Long (DDMMSS)
Site Alternative 1 (Only alternative)	Existing road is used, no alternative site is proposed. (Figure 6.1).	Start point	31°48'41.27"S	28°15'57.12"E
		Middle point (Bridge over Tora River crossing)	31°49'49.91"S	28°11'27.05"E
		End point	31°51'30.62"S	28° 6'16.90"E

Incremental (Layout) alternatives

The following layout alternatives are assessed:

Alternative	Description
Layout Alternative 1 (Only alternative)	The preferred layout consists of upgrading of the existing DR08034 road.

Other alternatives

No other alternatives are being assessed.

CONCLUSION

It has been determined that the current proposal *(preferred option)* is the only reasonable and feasible option which will be assessed further in the EIA, together with the No-Go option. This project involves the upgrading of an existing road and thus alternative locations or activities are not deemed reasonable or feasible.

1.4. Objectives

The main objective of this report is to assess the terrestrial ecological environment as well as the potential impact that the proposed development may have on the terrestrial habitat.

The following terms of reference were used for the objectives of this study:

- Describe the study area in terms of land cover and terrestrial habitat. This will include a full desktop analysis on the flora.
- Review relevant legislation, policies, guidelines and standards.
- Conduct a site survey to determine the actual ecological state of the study area and identify any species of conservation concern.
- This aspect of the report will specifically include the identification of the below in terms of flora -
  - Areas of high biodiversity;
  - The presence of species of conservation concern, including sensitive, endemic and protected species;
  - The presence of areas sensitive to invasion by alien species; and
  - The presence of conservation areas and sensitive habitats where disturbance should be avoided or minimised.
- Produce a sensitivity map that illustrates areas with significant developmental constraints.
- Describe the likely scope, scale and significance of direct and indirect positive and negative impacts resulting from the proposed development both on the footprint and the immediate surrounding area during construction and operation as well as the no-go option.
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required
- Identify any need for future permitting. **[NB: It is not the purpose of the studies to comply with or apply for any permitting requirements at this stage.]**

1.5. Approach

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop and baseline assessment of the project area was conducted in terms of current vegetation classifications and biodiversity programmes and plans. For the terrestrial flora, the consideration of the following has been included:

- Council for Geoscience (2013) South African Geology;
- Soil and Terrain (SOTER) Database of South Africa (2008);
- The South African Vegetation Map (Mucina and Rutherford, 2012);
- National Protected Areas Expansion Strategy (NPAES);
- National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011); and
- Eastern Cape Biodiversity Conservation Plan (ECPCP).

A site visit was conducted on 11 July 2019. The site visit was used to identify potential impacts of the proposed road upgrade and associated mining sites on the surrounding environment and to inform the significance of the potential impacts identified.

1.6. Assumptions and limitations

This report is based on information that is currently available and, as a result, the following limitations and assumptions are implicit–

- Descriptions of the natural and social environments are based on limited fieldwork and available literature.
- One site assessment was conducted, which limits the diversity identified on site. Plant identification is improved with flowering specimens, which are not present for all species at the same time.
- The entire property was not surveyed as impenetrable areas associated with alien forest proved challenging to access.
- Degradation of natural areas gave rise to difficulties in determining the boundaries of vegetation.
- All calculations (distance and area) were done in GIS (WGS 84 TM27).

1.7. Public consultation

The Public Participation Process (PPP) followed to date has been described in detail in the Draft and Final BAR. The draft ecological report (attached to the draft BAR) underwent a formal 30 day public commenting and review period from 28 November 2019 until the 30 January 2020. In addition, a public meeting was held on the 11 July 2019 and all comments and issues received during the meeting were included and addressed in the draft and final BAR. All proof and correspondence to date is available in the draft and final BAR. No comments have been received to date that relates to the ecological environment.

2. ASSESSMENT METHODOLOGY

Appendix 6
Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

The aim of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area is assessed as well as an identification of potential plant Species of Conservation Concern (SCC) that may occur in habitats present in the area. To a large extent, the condition and sensitivity of the vegetation will also determine areas with high biodiversity. This study also aims at identifying areas of high sensitivity and those that may be subject to significant impacts from the project.

The approach to determining the vegetation sensitivity of the study area is described below. Zones of low, moderate and high sensitive areas were identified by the presence or lack of the following:

- Degree of disturbance and transformation
- Presence of plant species of conservation concern.
- Vegetation types (which also constitute faunal habitats) of conservation concern.
- Areas of high biodiversity.
- The presence of important process areas such as:
  - Ecological corridors
  - Topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals)

A Geographical Information System (GIS) map was then drawn up depicting the different zones of sensitivity using available aerial imagery and relating this to the information gathered from the field survey.

It is not the aim of this study to produce a complete list of all plant species occurring in the region, but rather to examine a representative sample. It is however, important to note that areas of high sensitivity as well as SCC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site.

2.1. Species of conservation concern

Data on the known distribution and conservation status for each potential plant SCC needs to be obtained in order to develop a list of SCC. These plant species are those that are subject to significant impacts from the proposed activity. In general these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status ('red list' status) of individual species may provide additional valuable information on SCC (see http://www.iucnredlist.org/). SCC have been identified by means of a combination of applicable legislation, guidelines and conservation status lists. The following lists were utilised to cross reference conservation and protection statuses of various species:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) - Chapter 4, Part 2;

- Endangered and Protected Flora in the 1974 Provincial Nature Conservation Ordinance (PNCO) – Schedule 3 and 4;
- 1976 List of Protected Trees (Government Gazette No. 9542 Schedule A) in the 1998 National Forest Act (NFA) as amended in November 2014; and
- SA Red Data List.

The South African Red Data List of plants use the internationally recognised IUCN Red List Categories and Criteria to measure a species risk of extinction (Table 3.1).
Species that are afforded special protection, which are protected by CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) are also regarded as SCC (see http://www.cites.org/).

2.2. Sampling protocol

A drive through along the length of the road was conducted. The aim of this visit was to characterise and describe each vegetation community within the study site as well as identifying areas of high sensitivity and species of conservation concern. Visible species within the study site were identified using plant field guides and published literature.

Vegetation types within the study area were assessed and surveyed and vegetation communities were then described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score.

2.3. Vegetation mapping

The 2018 SANBI VegMap was used to describe the vegetation types found within the proposed development area. This is the third and latest update to the original 2006 Vegetation Map of South Africa, Lesotho and Swaziland. Changes made in the 2009 and 2012 versions were retained and additional portions of the 2006 map have been mapped at a finer scale, with 47 new vegetation types mapped since 2012 (SANBI, 2018). The map and accompanying book describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa.

This was compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

2.4. Sensitivity assessment

The sensitivity assessment approach entails identifying zones of high, moderate and low sensitivity according to a system developed by CES and used in numerous ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 11 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity (Table 2.3).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

Table 2.3: Criteria used for the analysis of the sensitivity of the area.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	**Topography**	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	**Vegetation** - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	**Conservation status** of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	**Species of special concern** - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	**Habitat fragmentation** leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	**Biodiversity** contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	**Erosion potential** or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
8	**Rehabilitation** potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9	**Disturbance** due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance
10	**Ecological function** in the landscape	Low ecological function. No corridors or niche habitats	N/A (There are NO moderate ecological functions. It is	High ecological function. Portions of entire sections of the site

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	(corridor, niche habitats)		considered either high or low)	contains corridors or niche habitats
11	**Ecological services** (food, water filter, grazing, etc.)	Low to no ecological services on site	Some sections of the site contains ecological services	Most of the site contains ecological services

A sensitivity map was developed with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted (see Chapter 6).

2.4.1. Biodiversity Regulations and Policy

National:
The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. These areas are included in the sensitivity map.

Provincial:
ECBCP 2007 is a detailed, low-level conservation mapping tool for land-use planning purposes. The aim of ECBCP is to map critical biodiversity areas through a systematic conservation planning process. The current biodiversity plan includes the mapping of priority aquatic features, land-use pressures, and critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

The main outputs of the ECBCP are "*critical biodiversity areas*" (CBAs), which are allocated the following management categories:

CBA 1 = Maintain in a natural state
CBA 2 = Maintain in a near-natural state

The ECBCP 2007 maps the CBAs based on extensive biological data and input from key stakeholders. Although ECBCP is mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver *et al*., 2005) it is still, for the large part, inaccurate and "course". Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007). It is also important to note that in absence of any other biodiversity plan, the ECBCP has been adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as a systematic biodiversity plan for the Eastern Cape.

2.4.2. Protected areas

The National Environmental Management Protected Areas Act (Act No 57 of 2003; NEMPAA) was developed to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. All protected areas within 15km of the study site were listed. Impacts were identified and mitigations proposed.

The goal of the National Protected Areas Expansion Strategy (NPAES) is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It

sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has classified protected areas into three categories: formally protected areas, informally protected areas and focus areas. Focus areas are large, intact and unfragmented areas suitable for the creation or expansion of large protected areas.

2.5. Impact assessment

2.5.1. Impact rating methodology

CES has developed an evaluation criteria of impacts in accordance with the requirements outlined in Appendix 2 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

Nature: negative or positive impact on the environment.
Type: direct, indirect and/or cumulative effect of impact on the environment.
Significance: The criteria in Table 9.1 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 9.2).
Consequence: the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
Extent: the spatial scale defines the physical extent of the impact.
Duration: the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
Probability: the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
Reversibility: The degree to which an environment can be returned to its original/partially original state.
Irreplaceable loss: The degree of irreplaceable loss which an impact may cause, e.g. loss of non-regenerative vegetation or removal of rocky habitat or destruction of wetland.
Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 2.4 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 2.4: Ranking of Evaluation Criteria

Nature	
Positive	Beneficial/positive impact.
Negative	Detrimental/negative impact.
Type	
Direct	Direct interaction of an activity with the environment.

Indirect	Impacts on the environment that are not a direct result of the project or activity.
Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	
Short term	Less than 5 years.
Medium term	Between 5-20 years.
Long term	More than 20 years.
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Study area	The proposed site and its immediate environments.
Municipal	Impacts affect the municipality, or any towns within the municipality.
Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Consequence	
Slight	Slight impacts or benefits on the affected system(s) or party(ies).
Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
Probability	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
Reversibility	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable loss	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.

Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
Mitigation potential	
Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed.
Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.

Table 2.5 Description of significance ratings

Significance Rating		Description
LOW NEGATIVE	**LOW POSITIVE**	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE NEGATIVE	**MODERATE POSITIVE**	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH NEGATIVE	**HIGH POSITIVE**	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.

3. RELEVANT LEGISLATION

Environmental legislation relevant to the proposed development is summarised in Table 3.1 below. Biodiversity Plans and Programmes are discussed in Chapter 5 where they are used to describe the desktop ecological conditions of the study area.

Table 3.1. Environmental legislation considered in the preparation of the Ecological Assessment for the proposed road upgrade

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE PROPOSED ROAD UPGRADE AND ASSOCIATED MINING SITES
The Constitution (Act 108 of 1996)	The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to this Management Plan, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right: *a) To an environment that is not harmful to their health or well-being; and* *b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:* *i. Prevent pollution and ecological degradation;* *ii. Promote conservation; and* iii. *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	• Obligation to ensure that the proposed activity will not result in pollution and ecological degradation; and • Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
National Environmental Management Act (NEMA) (Act 108 of 1998), and its subsequent amendments. NEMA Amended EIA Regulations (GNR. 326) (2017)	Relevant Sections of the Act: Section 2, 23, 24, 24-1, 28-33 • Application of the NEMA principles (e.g. need to avoid or minimise impacts, use of the precautionary principle, polluter pays principle, etc.) • Application of fair decision-making and conflict management procedures are provided for in NEMA.	• An application for Environmental Authorisation (as triggered by the Amended EIA Regulations) has been submitted to the Competent Authority (i.e. DEA and DMR).

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE PROPOSED ROAD UPGRADE AND ASSOCIATED MINING SITES
	• Application of the principles of Integrated Environmental Management and the consideration, investigation and assessment of the potential impact of existing and planned activities on the environment; socio-economic conditions; and the cultural heritage. NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. In addition NEMA introduced a framework for environmental impact assessments, the Amended EIA Regulations (2017).	• In terms of Section 28, every person who causes; has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent pollution or rectify the damage caused • This report complies with Appendix 6 of the Amended Environmental Impact Assessment Regulations (GNR. 326 of 2017) as regulated by the National Environmental Management Act (Act 107 of 1998 and amended in 2014; NEMA), which cover the requirements of the content of a Specialist Report. •
National Environmental Management: Biodiversity Act (Act 10 of 2004), and its subsequent amendments. Alien Invasive Species Regulations, 2014.	The National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, aims to assist with the management and conservation of South Africa's biological diversity through the use of legislated planning tools. In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species. The NEMBA Alien and Invasive Species List (Government Notice 599 of 2014) lists Alien and Invasive species that are regulated by the NEMBA Alien and	• An invasive species management, control and eradication plan for land/activities under their control should be developed, as part of their environmental plans in accordance with section 11 of NEMA. • Activities may not be carried out in threatened or protected ecosystems without first gaining authorisation for such activities. It should be noted that **one threatened ecosystems** as listed in NEMBA **has been identified within the project area.** • No protected species may be removed or damaged without a permit;

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE PROPOSED ROAD UPGRADE AND ASSOCIATED MINING SITES
	Invasive Species Regulations (Government Notice 98 of 2014).	• Several alien plant species were identified on site, see section 7.
Conservation of Agricultural Resources Act, (Act 43 of 1983).	The Conservation of Agricultural Resources Act, No. 43 of 1983 aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate problem plants were amended in March 2001.	• An invasive species monitoring, control and eradication plan for land/activities under their control should be developed as part of the construction environmental plans in accordance with CARA. • A number of alien invasive plants were identified on site. See section 7.
National Forest Act (Act 84 of 1998) and its subsequent amendments.	The NFA provides the legal framework for the protection and sustainable use of South Africa's indigenous forests. Any area that has vegetation which is characterised by a closed and contiguous canopy and under storey plant establishment is defined as a 'forest' and as a result falls under the authority of the Department of Environmental Affairs, Forestry and Fisheries (DEFF): Forestry sector. A clause in Chapter 3, Part 1 covers makes provision for the protection of forest (Section 7) and protected trees (Section 15). (a)	**No indigenous forest species were found within this area.**
National Water Act (Act 36 of 1998)	The purpose of this Act (Section 2) is to ensure that the Nation's water resources are protected, used, developed, conserved and controlled in ways that take into account, including: (a) Promoting sustainable use of water (b) Protection of aquatic and associated ecosystems and their biological diversity (c) Reducing and preventing pollution and degradation of water resources	• The current study does not assess the requirements for a water use application, but the information within can be used for the Authority to comment.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE PROPOSED ROAD UPGRADE AND ASSOCIATED MINING SITES
National Environmental Management: Protected Areas Amendment Act (No. 31 of 2004)	The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.	The site does not fall within or near any NEMA protected areas or areas identified as NPAES.
Cape Nature and Environmental Conservatino Ordinance (Act 19 of 1974) – Provincial Nature Conservation Ordinance (PNCO)	The Ordinance makes provision for conservation of the natural environment; and the protection of wildlife. Certain biota are scheduled and therefore protected. A permit must be obtained from Department of Economic Development, Environment Affairs and Tourism (DEDEAT), Provincial Environment Affairs (Biodiversity Unit), to remove or destroy any plants or other biota listed in the Ordinance.	• One protected plant species were identified on site during the site assessment, *Aloe pluridens.* • A search and rescue operation will be conducted on any species that has been identified as protected. In terms of the ordinance, care should be taken with regards to the fauna on site. It is illegal to kill/ capture any; Lizards (Oredr – Lacertillia), Frogs and toads (Order – Anura); Shrews (Family – Soricideae); bats (except fruit bats); Snakes (water snakes, house snakes, wolf snakes, mole snakes, green and bush snakes, egg eaters and slug eaters and almost all birds).
Environmental Conservation Act (ECA) (Act 73 of 1989)	Section 20 of the Act requires for the appropriate disposal of waste and licensed waste disposal sites, although any new waste licenses are subject to approval via the NEMWA (below).	All wastes (general and hazardous) generated by the Contractor should be disposed of at an ECA or NEMWA licensed waste disposal site, whichever is relevant to the area.
National Environmental Management: Waste Act (NEMWA) (Act 59 of 2008).	The Act provides for a national norm for the storage and handling of waste; and provides minimum standards for new and existing waste storage sites, and the licensing of new waste disposal sites.	

4. DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

The study area and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications, biodiversity programmes and plans. This was followed by a site visit in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities (see Chapter 5).

Background and Literature review

Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the Eastern Cape Province. The following applicable documents/plans are included:

- SANBI National vegetation (Mucina & Rutherford, 2012);
- Council for Geoscience (2013) South African Geology;
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Eastern Cape Biodiversity Conservation Plan (ECBCP2007);
- National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011);
- Review of the SANBI Red Data List;
- Convention on International Trade in Endangered Species (CITES);
- Provincial Nature Conservation Ordinance (PNCO);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation; and
- National Forest Act: List of Protected Trees (2014).

4.1. Climate

Climate data on the nearest town, Engcobo, was used to describe the climate of the study area. Engcobo normally receives about 701 mm of rain per year, with most rainfall occurring mainly during summer. The chart below (lower left) shows the average rainfall values for Engcobo per month. It receives the lowest rainfall (6 mm) in June and the highest (110 mm) in February. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Engcobo range from 18.6°C in June to 27°C in January. The region is the coldest during July when the mercury drops to 3.8°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

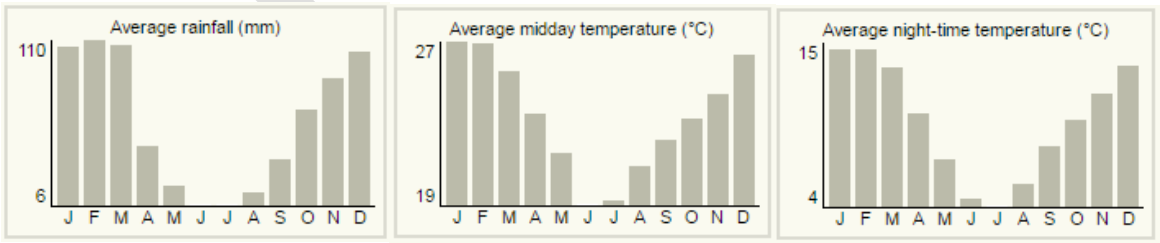


Figure 4.1 Engcobo weather data.

4.2. Topography

The proposed road upgrade is located within a dissected plain on sloping lands with an elevation range of about 626 m.a.s.l. to about 792 m.a.s.l. (Figure 2.2 and 2.3).

Figure 4.2 Elevation profile along the ugpraded road portion from Manjana.

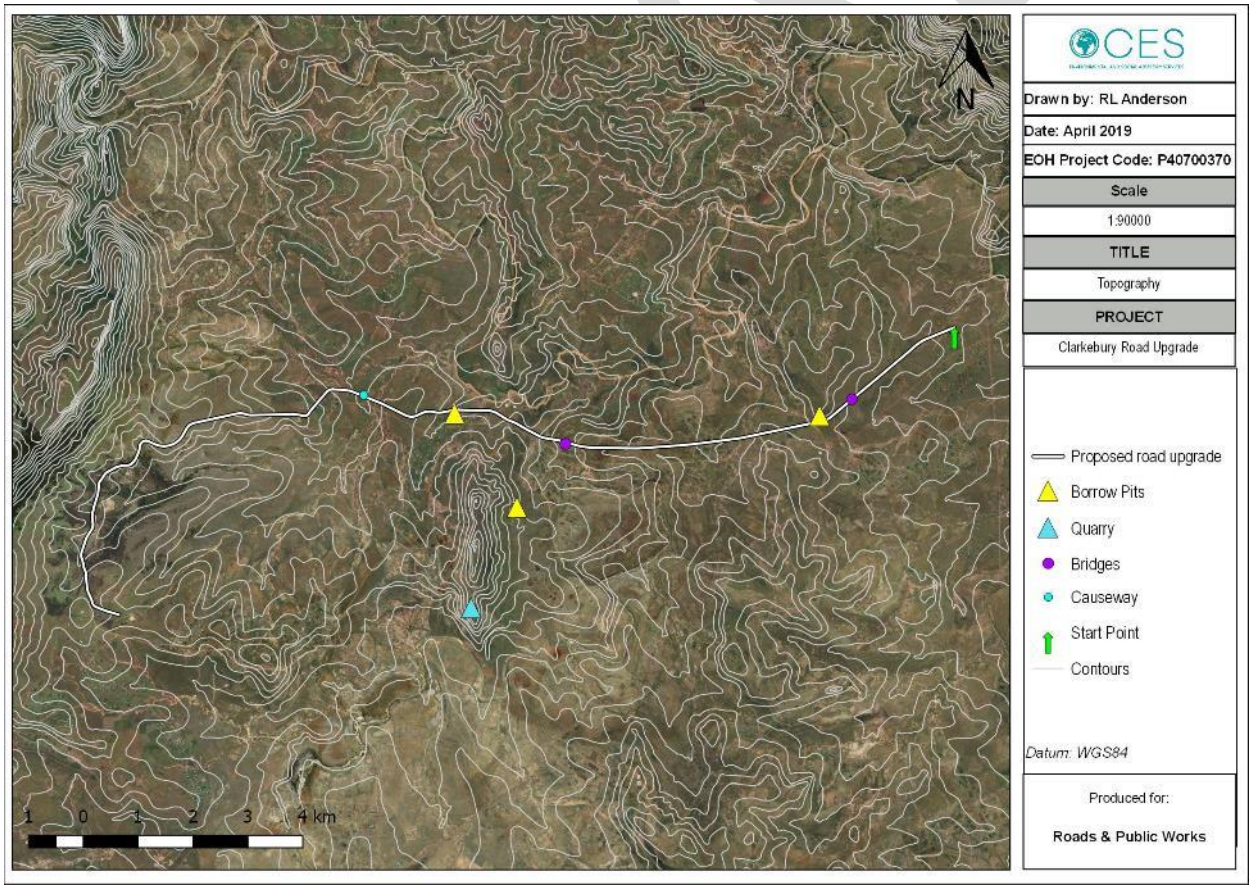


Figure 4.3 Contour map of the road upgrade site.

4.3. Geology and Soils

The proposed road upgrade and associated borrow pits fall over an area dominated by Mudstones of the Tarkastad Subgroup within the Beaufort Group (Figure 2.4).

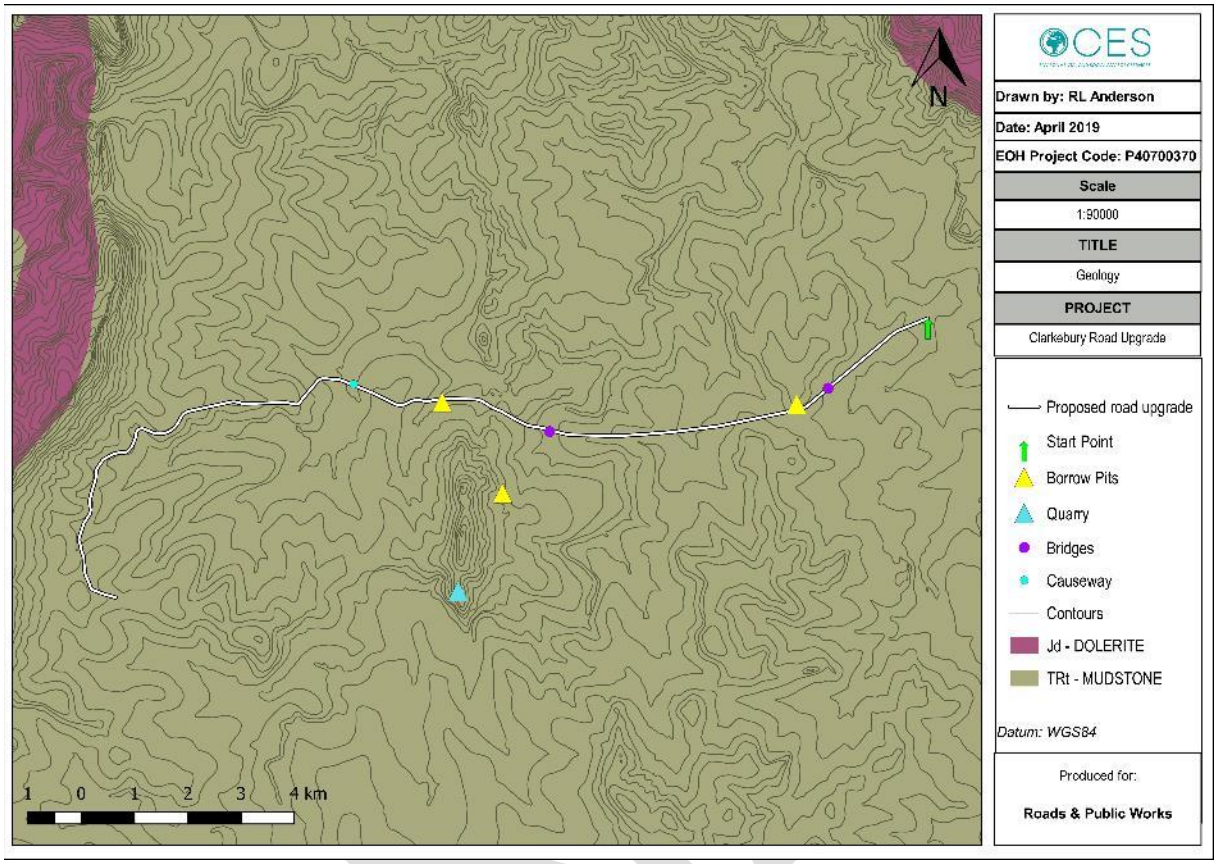


Figure 4.4: Geology map of the project site.

The SOTER Soil Association Map (Figure 2.5) indicates that the soils of the development site are classified as soils with a marked clay accumulation as well as soils with minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils.

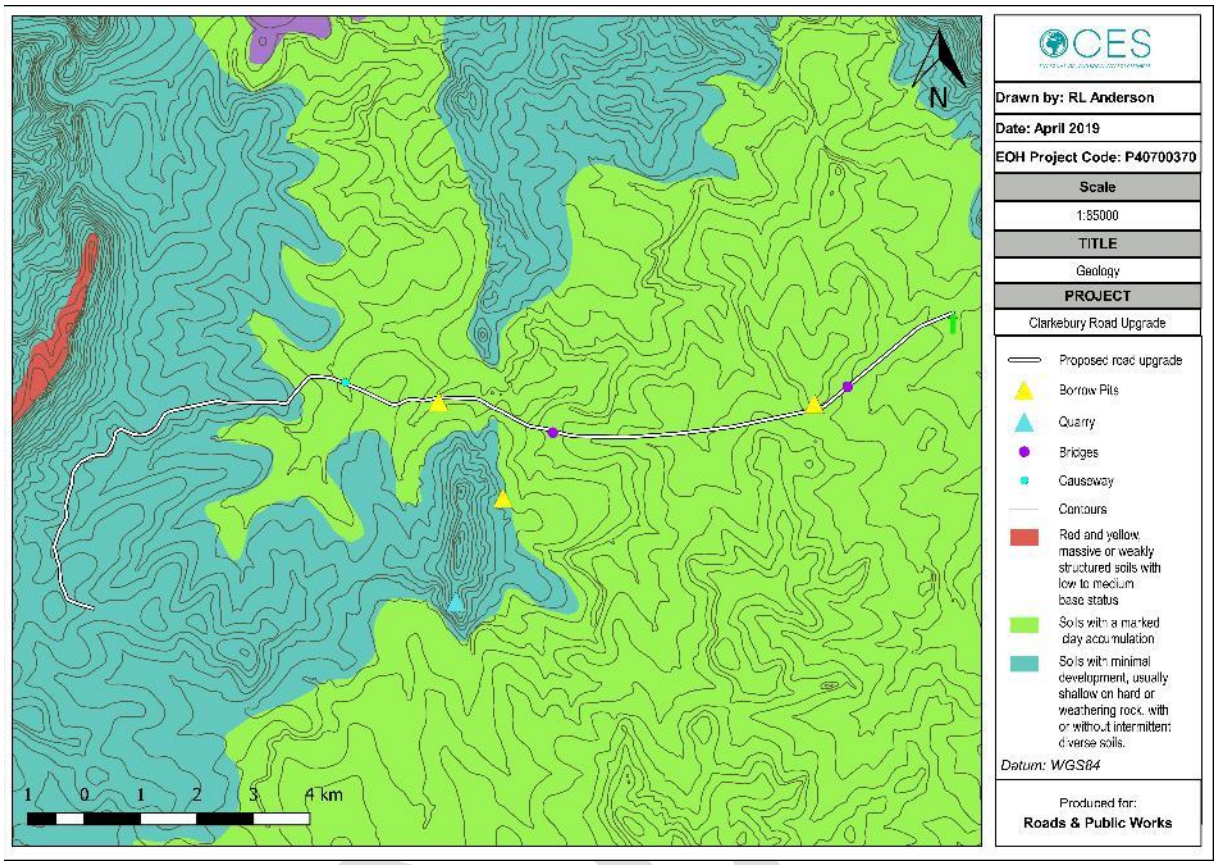


Figure 4.5: Generalised soils of the proposed project site.

4.4. Rivers, Watercourses and Drainage Lines

The proposed road upgrade includes the upgrading of two bridges for the Tora and Bholotwa river crossing and one causeway for the Mgwali river crossing (Figure 4.6.2). The road upgrade and associated mining sites traverse a number of rivers and river tributaries as indicated in Figure 4.6.1 below. The road route, as well as two of the proposed mining sites, falls within numerous natural and artificial wetland buffers. According to the NFEPA wetland map the road upgrade will not directly impact any wetlands. The study area is located within three (3) quaternary catchments, namely T12E, T12F and T12G within Water Management Area (WMA) 7, the Mzimvubu to Tsitsikamma region.

The impacts on the aquatic environment will be assessed in greater detail during the Aquatic Impact Assessment conducted for the proposed road upgrade.

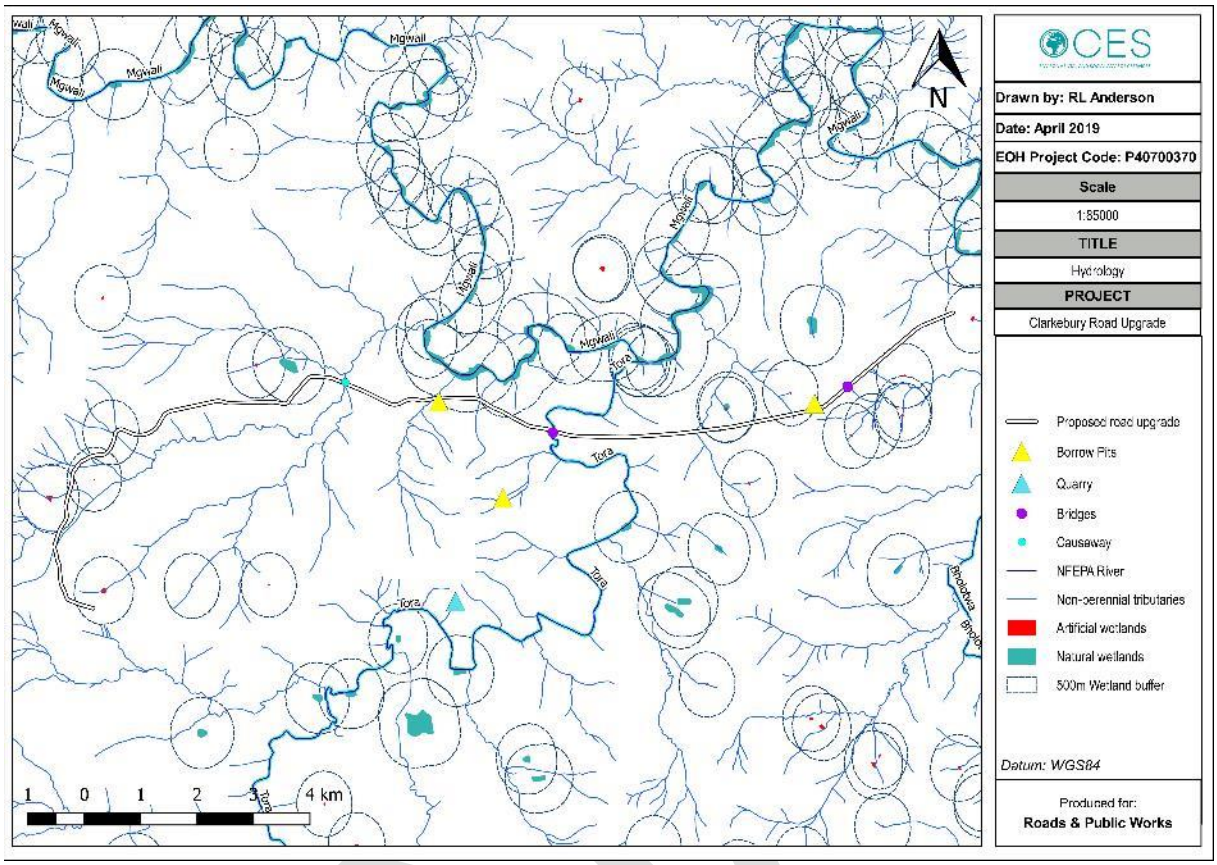


Figure 4.6.1 Rivers and wetlands surrounding the project site.

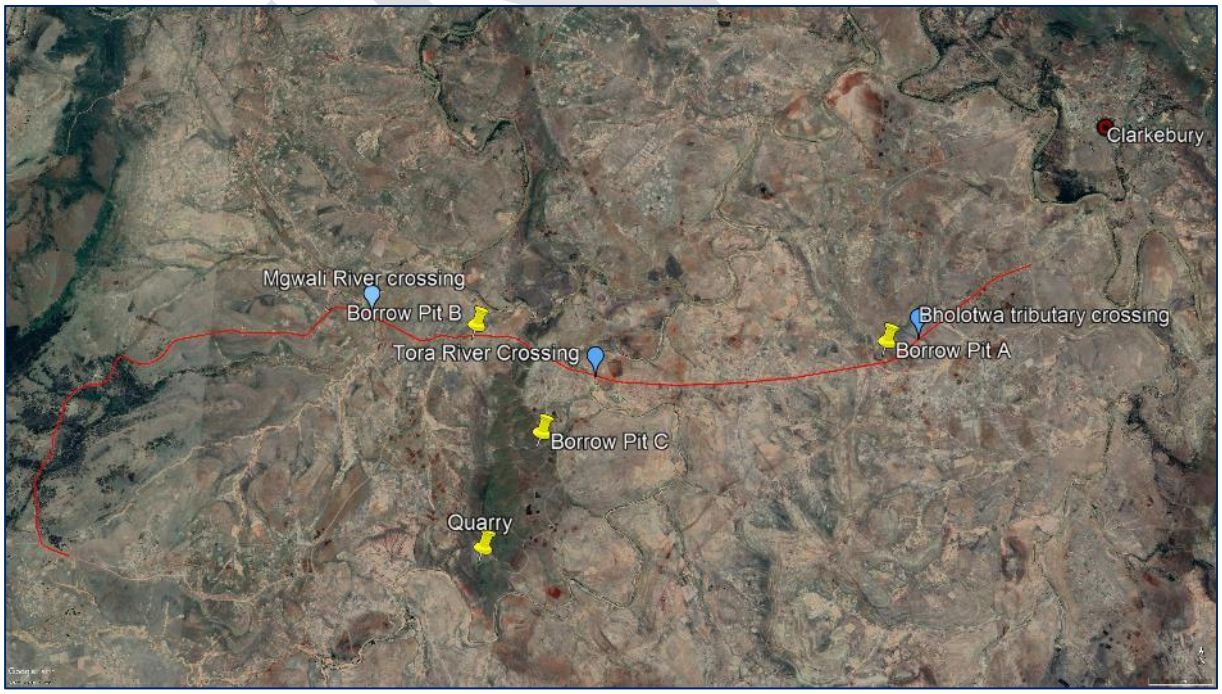


Figure 4.6.2 Positions of bridges and causeways indicating major river crossings

4.5. Land cover

A desktop study of the landcover within the study area indicated that the area is made up of cultivated: temporary – semi – commercial / subsistence dryland; degraded: unimproved grassland; forest; forest plantations; thicket and bushland; unimproved grassland and low density urban areas (Figure 4.5).

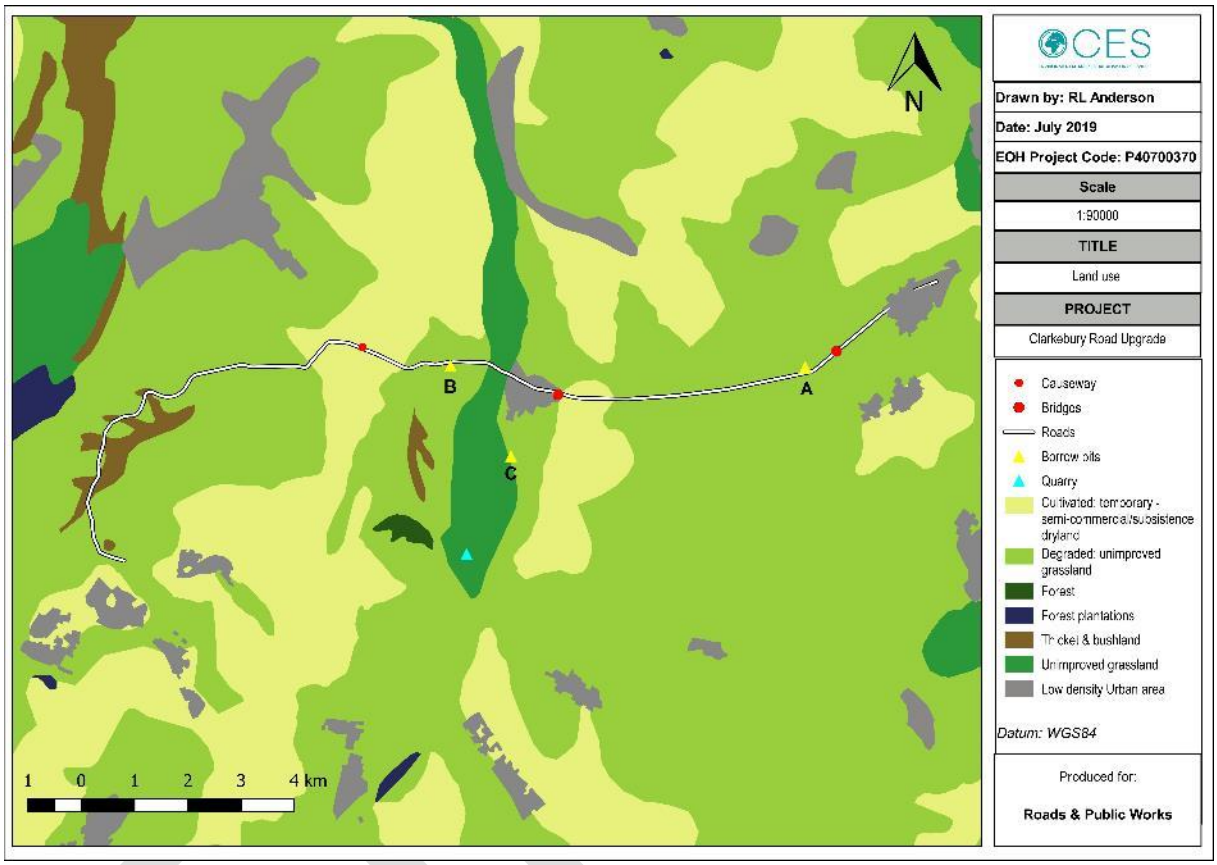


Figure 4.5. Land cover within the Road upgrade study area.

4.6. Vegetation and floristics

4.7.1. SANBI classification (SANBI, 2018)

The South African National Biodiversity Institute (SANBI) map indicates that the road falls within **Mthatha Moist Grassland**. Mthatha Moist Grassland occurs on the undulating plains and hills between Mthatha and Butterworth at an altitude of 600-1080m. The vegetation is species-poor, sour, wiry grassland with *Eragrostis plana and Sporobolus africanus*, dominated by *Themeda trianda*. This vegetation type is classified as ENDANGERED according to Mucina & Rutherford (2012), with a conservation target of 23%. More than 40% is transformed for cultivation and plantations and dense rural human settlements. Other issues faced by this vegetation type are alien invasive plants species and erosion.

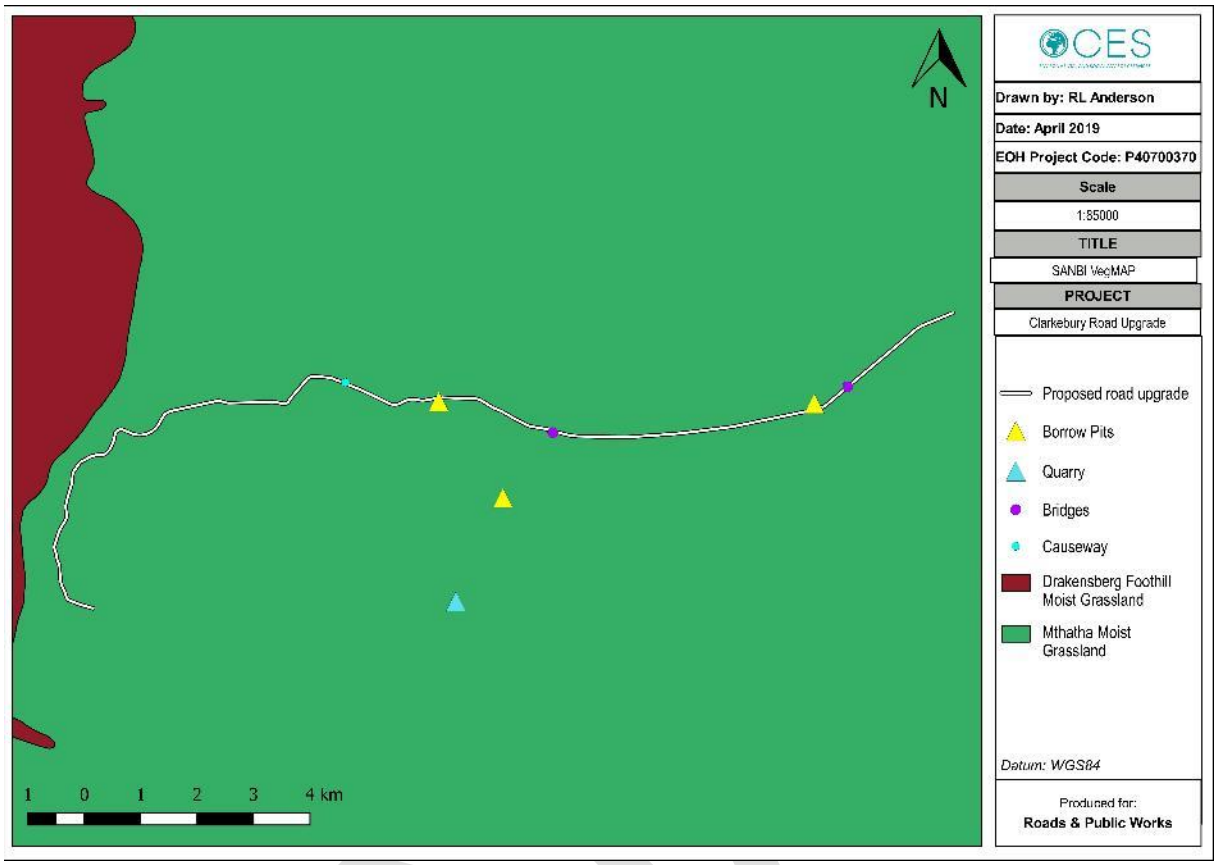


Figure 4.8: Vegetation of the Clarkebury Road Upgrade (SANBI classification).

4.7.2 Forest classification (NFA)

No indigenous forest patches occur within or near the proposed road upgrade and mining sites. Therefore, no natural forest will be impacted by the proposed development.

4.8.1 Eastern Cape Biodiversity Conservation Plan (ECBCP2007)

The Eastern Cape Biodiversity Conservation Plan (ECBCP2007) is a broad scale systematic biodiversity plan. It must be consulted as it represents the systematic biodiversity plan adopted by the competent authority (DEDEAT), which triggers listed activities requiring Environmental Authorisation (Figure 4.9). Furthermore, it must be verified via an on-site field assessment given potential inaccuracies and errors. The ECBCP is currently being updated.

Key limitations of the ECBCP CBA Map

1. The ECBPC is a provincial scale assessment, with data such as STEP at a scale of 1:100 000 and expert mapping at 1:250 000. Ground-truthing is thus required. Refer 'evaluation' below.
2. The updated NFEPA wetlands map was not available at the time to better reflect wetlands or priority catchments (due to outdated land cover etc.).
3. Although the systematic biodiversity planning methodology attempts to avoid known conflicting land uses, such as agriculture, mining or housing, this information is not always available. Thus, it is the biodiversity sector's input into land use planning and decision making.

The ECBCP2007 indicates that the proposed road upgrade and associated mining sites falls within a **terrestrial CBA 1 and 2**. The majority of the road upgrade and all of the proposed mining sites fall within terrestrial CBA 2.

The management requirements of CBA 1 and 2 are as follows (taken from the ECBCP 2007 Handbook):

CBA area	Management requirements
CBA 1	These areas are considered as natural landscapes and biodiversity must be maintained in an as natural state as possible so that there is no future biodiversity loss.
CBA 2	These areas are considered as near-natural landscapes and biodiversity must be managed in a near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.

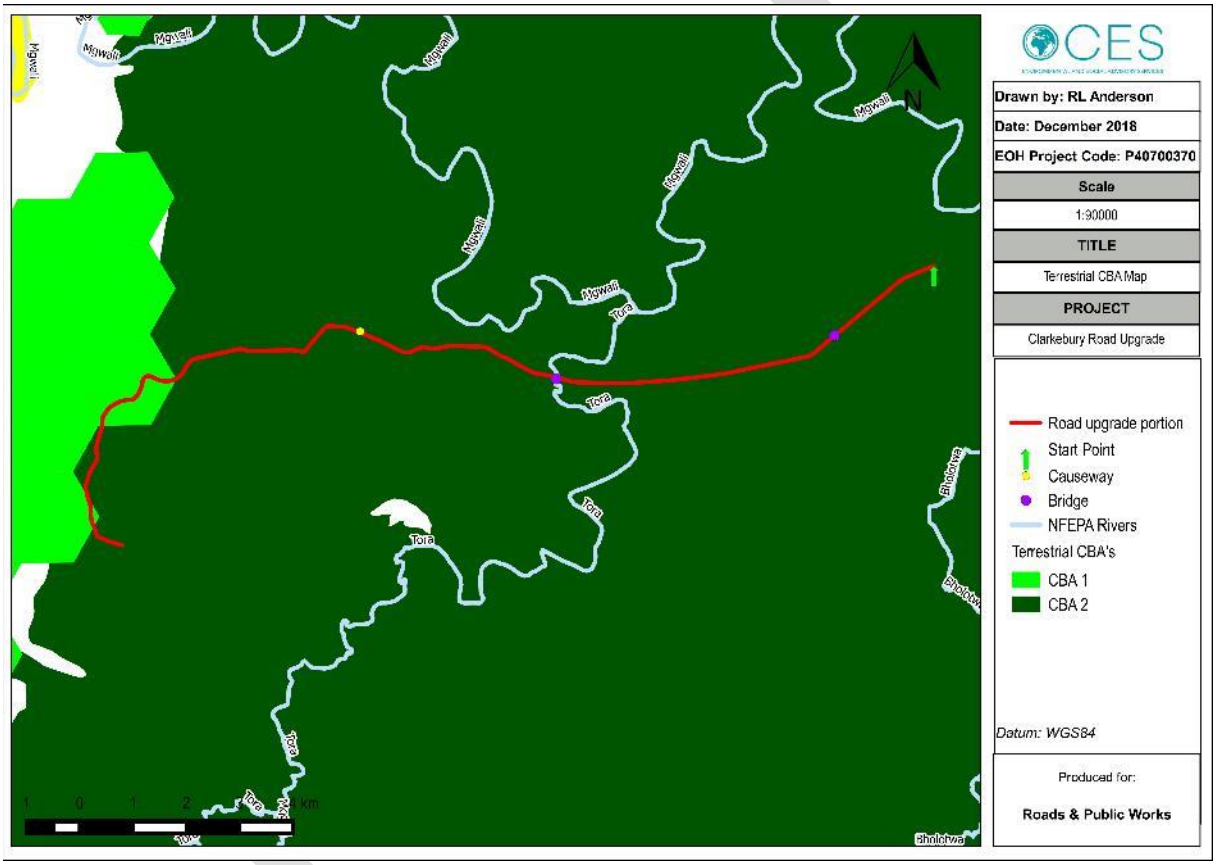


Figure 4.9: ECBCP (2007) Terrestrial conservation biodiversity classes for the proposed Clarkebury Road Upgrade and associated mining sites.

4.8.2. Threatened Ecosystems

The National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA) has released a national list of ecosystems that are threatened and in need of protection (GN. 1002 of 2011). The entire study site falls within the **Mthatha Moist Grassland** NEMBA Threatened Ecosystem (Figure4.10).

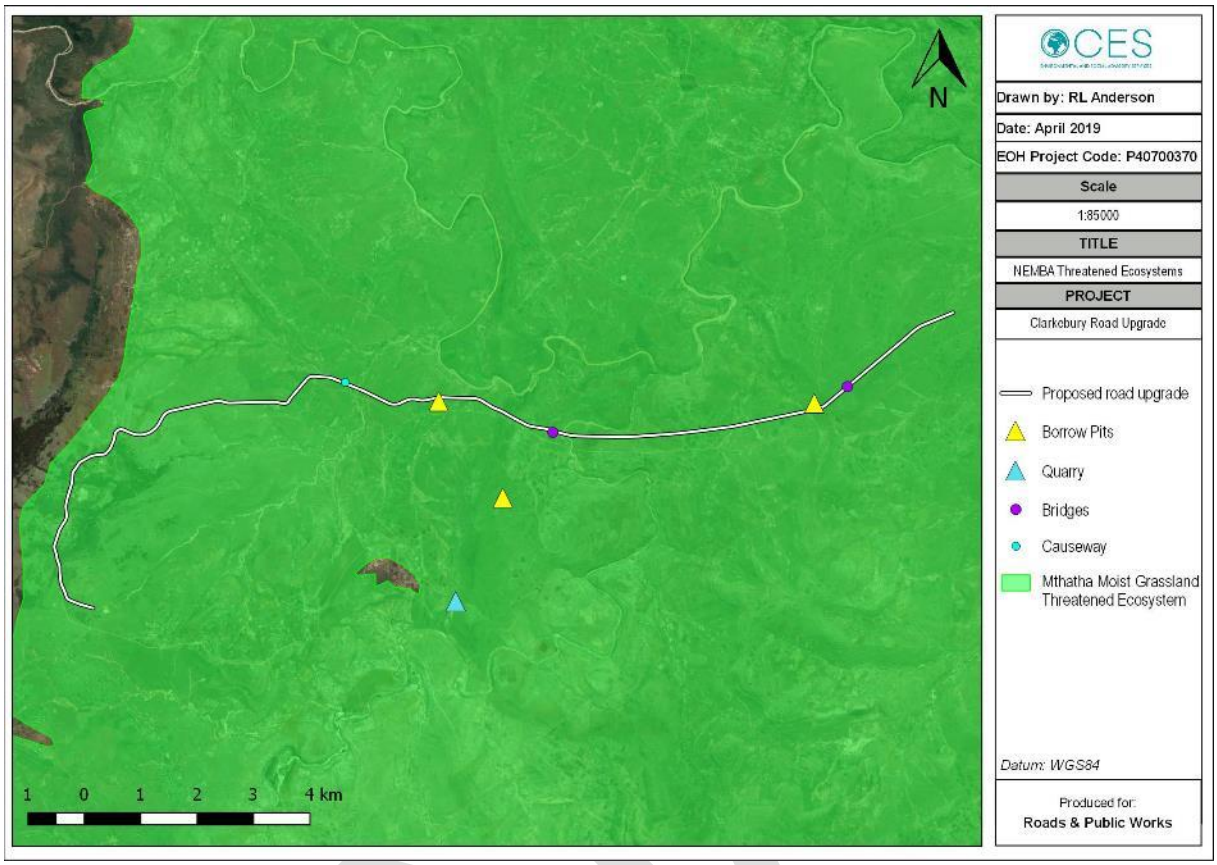


Figure 4.10. NEMBA Threatened Ecosystems within the proposed road upgrade and associataed mining sites study area.

4.8.3. Protected Areas

Target areas (focus areas) for expansion of the Protected Area network in South Africa were identified through a systematic biodiversity planning process undertaken as part of the development of the 2008 National Protected Area Expansion Strategy (NPAES), as well as the 2012 provincial Protected Area Expansion Strategy.

The proposed development does not fall within or near to an NPAES protected area or focus area.

4.8.4. Floristics

Plant species of conservation concern comprise those species that are either threatened (Critically Endangered, Endangered, Vulnerable), rare or declining. The South African National Biodiversity Institute (SANBI) Plants of Southern Africa (POSA) plant database (http://posa.sanbi.org), was consulted, along with the categories indicated in the SANBI Threatened Species Programme website (http://redlist.sanbi.org/species.php?species) to identify potential species of conservation concern within the proposed development footprint (Table 4.1). The following list of potential plant SCC has been derived from current literature for possible vegetation found in the area as well as the international IUCN Red Data list, the South African Red Data List, DAFF protected trees, the Provincial Nature Conservation Ordinance (PNCO), and CITES. A full list of the potential species found within the project region is attached as Appendix 2.

Table 4.1. Species of conservation concern that potentially occurr within the proposed development footprints (http://posa.sanbi.org)

Family	Species Name	Ecology	SA Red list/IUCN
Ericaceae	*Bauhinia bowkeri*	Indigenous; Endemic	SANBI Red List; **Near Threatened**
Iridaceae	*Crocosmia masoniorum*	Indigenous; Endemic	SANBI Red List; **Vulnerable**
	Freesia laxa subsp. Laxa	Indigenous	SANBI Red List; **Vulnerable**
Lamiaceae	*Plectranthus praetermissus*	Indigenous; Endemic	SANBI Red List; **Vulnerable**

5. SITE INVESTIGATION

A site investigation was conducted on 11 July 2019 to:

- Verify desktop findings;
- Assess the actual ecological state;
- Assess the current land-use;
- Identify potential sensitive ecosystems;
- Identify plant species communities associated with the proposed project activities; and
- Identify animal species associated with the proposed project activities.

The site visit also served to inform potential impacts of the proposed project and to inform the significance of these impacts on the surrounding ecological environment. Vegetation was assessed within the entire project boundary.

During the site assessment, ground truthing indicated that the study area was characteristic of degraded grassland vegetation, low density rural homesteads, subsistance farming and grazing lands and some scattered aliens. The area towards the end of the road upgrade portion nearest to the Mjanyana hospital, was characterised by dense stands of alien vegetation, specifically *Acacia mearnsii, Eucalyptus sp* and *Pinus elliotii.*

The ariel imagery below illustrates the vegetation and aquatic environments of the proposed road upgrade section as well as the associated mining sites.

Road upgrade portion showing vegetation and water crossings

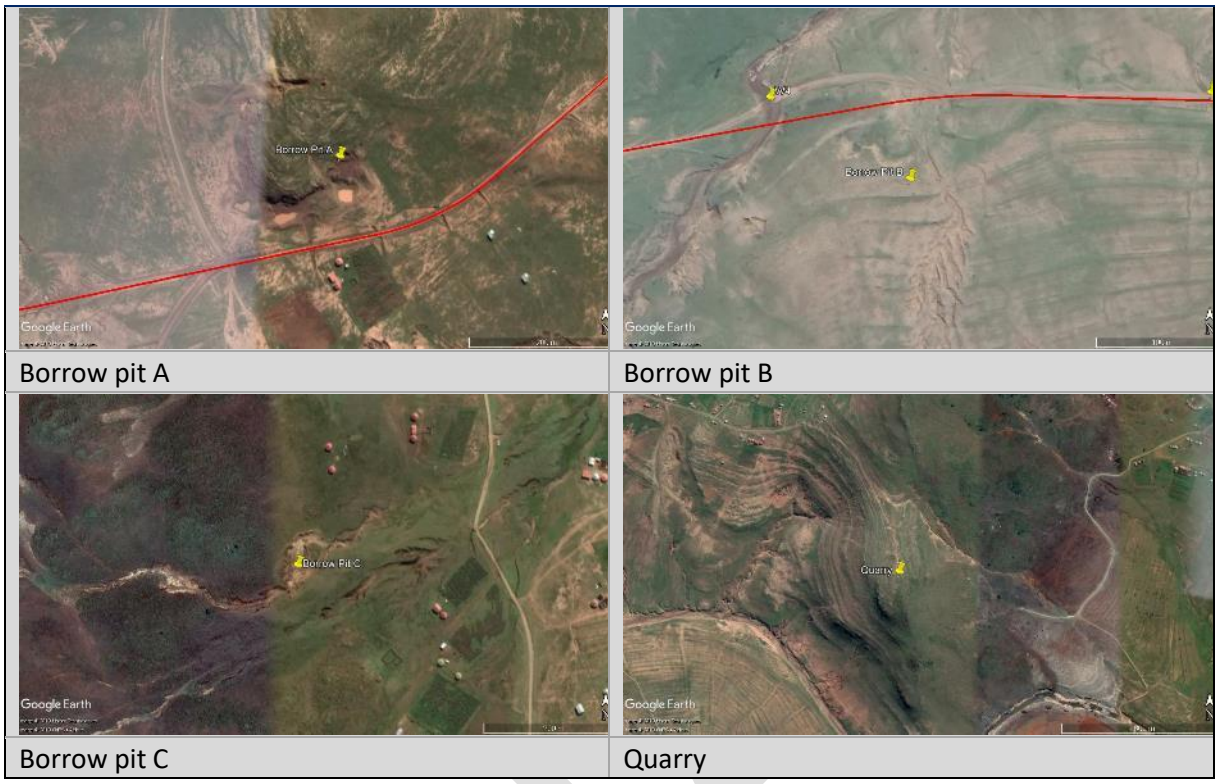


Figure 5.1. Land cover within the Road upgrade study area.

5.1 Vegetation survey

The vegetation found within the study area was dominated by grassland, however certain portions that will be directly affected by the mining activities as well as the road upgrade differed from the dominant grassland vegetation type. Borrow pit C and the Quarry site was made up of a plant population dominated by *Aloe ferox* and *Aloe pluridens* trees, with some scattered indigenous trees and shrubs and alien plant species. The section of the road upgrade portion nearest the Mjanyana hospital was made up of a dense patch of alien plant species with some scattered indigenous plant species. Plate 5.1 photographically illustrates and details the various vegetation communities found on site.

The majority of the road upgrade portion was made up of grassland vegetation communities with scattered *Eriocephalus africanus* shrubs.

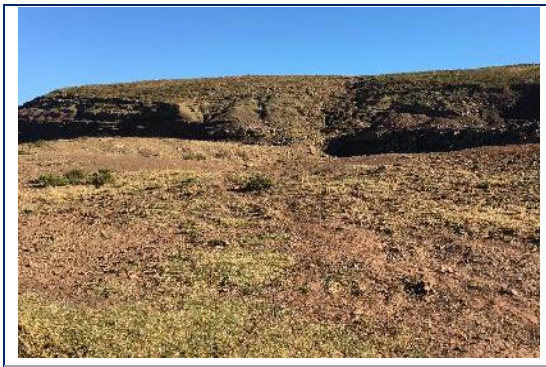
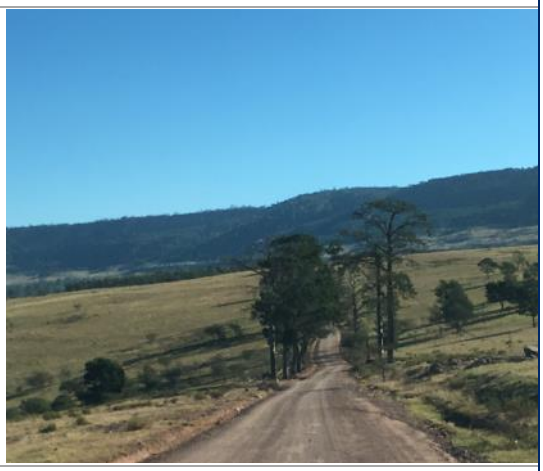
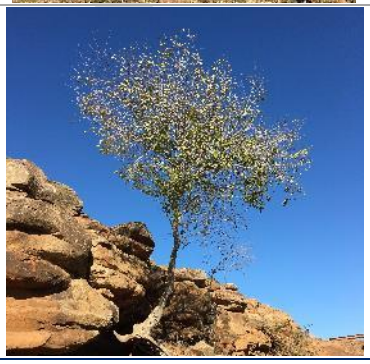
	
The vegetation community observed at borrow pit A was made up of degraded grassland. The proposed mining site was dominated by bare soils.	Borrow pit B was dominated by grasses with some scattered shrubs.
	
The proposed mining site location for Borrow pit C was dominated by grasses and bare soils, however some *Aloe sp.* will be affected by the mining activities.	The proposed site for the quarry was dominated by *Aloe sp.* and indigenous grasses with some scattered trees and shrubs.
	
The end portion of the road upgrade approaching the Mjanyana hospital. This portion was dominated by dense stands of alien vegetation comprising of mainly *Pinus sp, Acacia mearnsii,* and *Eucalyptus sp.* Some indigenous plant species were found within this vegetation community, however no plant SCC were observed within the community during the site visit.	

Plate 5.1. On-site vegetation communities

5.1.1. Plant species observed

A total of 21 plants were identified during the site visit. These plants, along with their protection status, are illustrated in **Plate 5.2.** A full list of plants that may occur in the region can be found in Appendix 2. No NEMBA TOPS were identified on site, however one PNCO protected species was identified.

Photograph	Species name	Threat status
	*Acacia natalitia*	Least concern (SA Red data list)
	*Aloe ferox*	Least concern (SA Red data list)
	*Aloe pluridens*	Schedule 2 Protected Flora (PNCO)
	*Celtis africana*	Least concern (SA Red data list)

	*Chaetacanthus setiger*	Least concern (SA Red data list)
	*Cussonia spicata*	Least concern (SA Red data list)
	Eriocephalus africanus	Least concern (SA Red data list)
	Felicia muricata	Least concern (SA Red data list)
	Gymnosporia buxifolia	Least concern (SA Red data list)
	Hypoestes aristata	Least concern (SA Red data list)

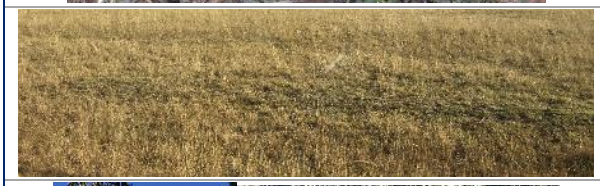
	Sonchus dregeanus	Least concern (SA Red data list)
	Sporobolus africanus	Least concern (SA Red data list)
	Ziziphus mucronata	Least concern (SA Red data list)
Alien Plant Species		
Family	Species name	NEMBA Category
Fabaceae	*Acacia mearnsii*	Category 2
Papaveraceae	*Argemone mexicana*	Category 1b
Myrtaceae	*eucalyptus grandis*	Category 1b
Verbenaceae	*Lantana camara*	Category 1b
Cactaceae	*opuntia ficus indica*	Category 1b
Pinaceae	*Pinus elliotii*	Category 2
Araliaceae	*Schefflera elegantissima*	Category 3
Solanaceae	*Solanum mauritianum*	Category 1b
Asteraceae	*Taraxacum officinale*	Not listed
	Cirsium vulgare	Category 1b

Plate 5.2 Plant species identified on site.

5.2 Faunal survey

Appendix 1 lists various faunal species (birds, amphibians, reptiles and mammals) that may potentially occur within the study area for the road upgrade and associated mining activities.

Fauna observed during the site investigation included sheep, cattle and one hare. The area is not characteristic of highly diverse wild animal populations, however grassland is usually home to many small mammal and reptile species.

5.3 Aquatic environment

An seperate Aquatic Impact Assessment has been conducted for the proposed road upgrade and associated mining activities.

6. SENSITIVITY ASSESSMENT

Appendix 6
Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

6.1 Conservation and spatial planning tools

Several conservation planning tools are available for the study area. These tools allow for the potential identification of any sensitive and important areas from an ecological perspective at the early stage of a development and allow for the fine-tuning of plans and infrastructure layouts.

The following tools were identified as relevant to the site and are summarised below:

- SANBI Vegetation threat status;
- NEMBA Protected Ecosystems; and
- Nature and Environmental Conservation Ordinance No. 19 of 1974

The conservation status of The Mthatha Moist Grassland vegetation type that occurs within the project site (Mucina and Rutherford, 2012) is considered as **Endangered** by SANBI. The site assessment however indicated some vegetation within the study site was previously disturbed for subsistence farming. The entire study area was classified by **NEMBA** (National list of ecosystems that are threatened and in need of protection; 2014) in terms of the list of **threatened ecosystems** as a threatened ecosystem. The area falls within Critical Biodiversity Areas – Terrestrial CBA 2 and does not fall within an Aquatic CBA.

6.2 Sensitivity allocation

A sensitivity map was developed based on the methodology presented in Table 6.1, for the entire study area. The following sensitivity criteria were allocated for the proposed road upgrade and associated mining activities. The allocation of criteria was based on both the desktop biophysical description of the site as well as observations made during the site visit.

Table 6.1. Criteria used for the analysis of the sensitivity of the proposed new Heyserskand Loop.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	**Topography**	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	**Vegetation** - Extent or habitat type in the region	Extensive throughout the region	Restricted to a particular region / zone	Restricted to a specific locality / site

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
3	**Conservation status** of fauna / flora or habitats	Well conserved/ independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	**Species of conservation concern** - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics	One or more Species of Conservation Concern, or more than 2 endemics or rare species
5	**Habitat fragmentation** leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	**Biodiversity** contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High diversity and species richness
7	**Erosion potential** or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
8	**Rehabilitation** potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9	**Disturbance** due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance
10	**Ecological function**	Habitat widely represented in the landscape not specifically harbouring any unique habitat features…etc.	Intermediate role in ecological function	Key habitat involved in ecological processes (ecological corridors and network areas or key niche habitats)
11	**Ecological Services**	Little to no ecological services	Some ecological services.	Various ecological services. Areas should be conserved.

Site sensitivity was determined based on the following criteria as classified in Table 6.1 above:

Table 6.2: List of criteria contributing to the sensitivity map

CRITERIA	Road	Borrow pit A	Borrow pit B	Borrow pit C	Quarry
Topography	Undulating; fairly steep slopes				
Vegetation	Extensive vegetation in region (Mthatha Moist Grassland)				
Conservation status	Not well conserved, moderate conservation value			Restricted to a specific locality / site	
Species of conservation concern	None, although occasional regional endemics			One species of conservation concern was found on site, a protected *Aloe sp.* Many endemics occurred on site.	
Habitat fragmentation	Due to the extent of the habitat and size of the development footprint, the proposed development will not result in habitat fragmentation			Limited areas of this habitat, susceptible to fragmentation	
Biodiversity	Low diversity or species richness			Moderate diversity, and moderately high species richness	
Erosion potential	The entire study area comprises of soils highly susceptible to erosion				
Rehabilitation	Site is easily Rehabilitated				
Disturbance	There is some degree of disturbance of the site.				
Ecological function	The grassland habitat is widely represented in the landscape not specifically harbouring any unique habitat features.			The vegetation community found within borrow pit C and the quarry site was restricted to only a few hill tops within the entire study area.	
Ecological Services	Some ecological services.				

The following maps reflect ecological sensitivity identified within the study area of the proposed road upgrade and associated mining sites. Due to the conservation status of the vegetation type, the entire study are falls within a MODERATE sensitivity zone, with some areas falling within HIGH sensitivity areas due to their proximity to watercourses and plant species population composition.

Although all proposed mining areas fall within or adjacent to watercourses, it is important to note that the Quarry site and Borrow pit C are additionally demarcated as highly sensitive due to the presence of a large plant SCC population within the proposed sites.

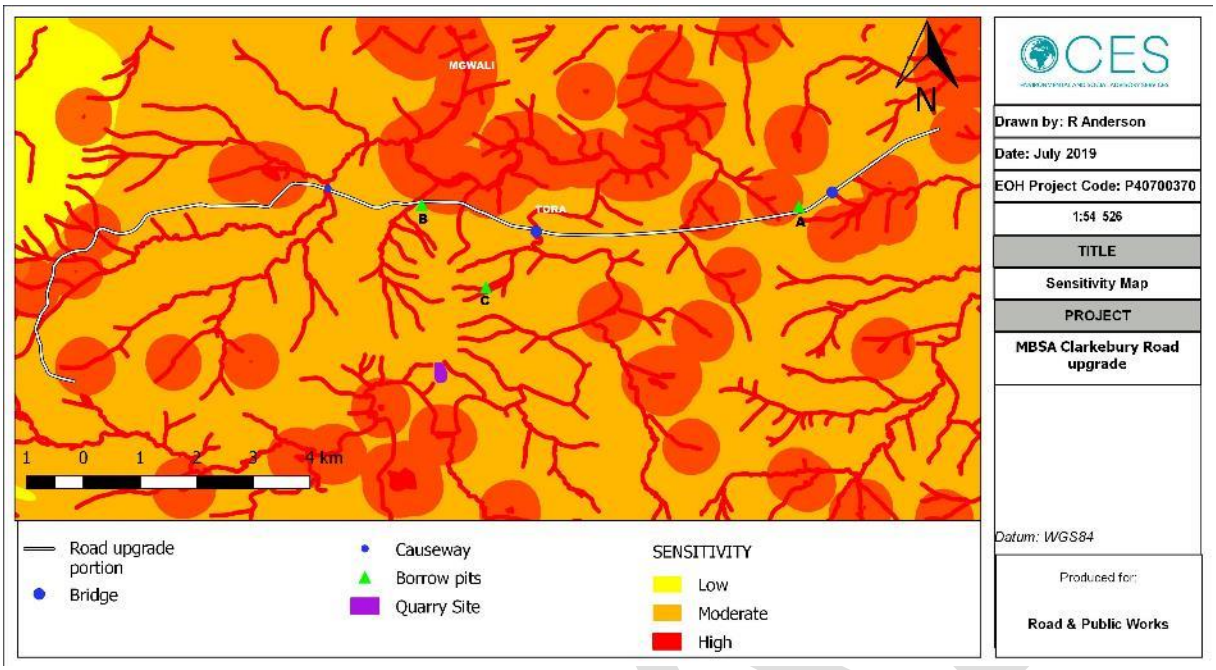


Figure 6.1: Sensitivity of the study area.

High sensitivity:

High sensitivity areas have been demarcated using a 32 m buffer from the river line as well as a 500m buffer from NFEPA wetlands. Furthermore, areas which have one or more Species of Conservation Concern should be considered as highly sensitive areas. Areas that have high diversity and species richness were considered highly sensitive and as such are subject to strict mitigation measures. Loss of SCC is prohibited and further impacts must be kept to a bare minimum. In the event of SCC being impacted, permits must be obtained, a relevant search and rescue operation must take place and the necessary relocation/ mitigation measures agreed upon must be conducted.

Moderate sensitivity:

Moderate sensitivity was allocated to areas that fell within 32-100m of rivers and areas with moderately steep topography. These areas can withstand a limited loss of, or disturbance to, natural vegetation. Mitigations measures and best practice as identified in this report shall apply to the activities within these zones, but do not prohibit development. Where possible, avoidance of habitat loss, hydrological feature impacts and vegetation clearance should be limited as far as possible, with preference for more disturbed regions first. Rehabilitation of disturbed soil will be addressed during and as construction progresses (and will not wait until construction has been completed) and will include soil stabilisation and re-vegetation.

Low sensitivity:

In areas where the natural vegetation is extensive, such as the areas containing Drakensburg Foothill Moist Grassland vegetation, falling on low and even slopes are classified as *LOW sensitivity* areas. These areas are suitable for development and will only require low-level mitigations. If SCC are found within the demarcated *LOW Sensitivity* areas, then they are considered highly sensitive and measures as explained above should be implemented.

6.3 Issues and impacts identified

Various issues have been identified as **HIGHLY sensitive** in the sensitivity assessment, which will impact the local ecology associated with the proposed road upgrade and mining activities during all phases of development (including Planning and Design, Construction and Operational phases).

The following issues were identified during the sensitivity assessment:

Table 6.2: Issues identified during the sensitivity assessment of the proposed road upgrade and associated mining activities.

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Loss of Species of conservation concern.	The permanent clearance of natural vegetation for the construction of the road upgrade and associated mining activities may result in the permanent loss of plant SCC.
Loss of Threatened Ecosystem.	The permanent loss of Threatened Ecosystem for the widening of the road and associated mining activities will further threaten the ecosystem.
Impacts to aquatic environment	The construction activities associated with the road upgrade and mining sites may result in sedimentation, pollution and alteration to the geomorphology of the affected watercourses. This has been assessed in the Aquatic Impact Assessment.

Various mitigations are recommended (based on the various levels of sensitivity) to reduce the impacts of the proposed road upgrade and associated mining activities on the natural environment within the development area. These are discussed in more detail in Chapter 8.

7. ALIEN INVASIVE SPECIES

An "*invasive species*" is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

Alien invaders that may ocurr onsite, identified on POSA (http://posa.sanbi.org/sanbi/Explore), for the development site include; *Salsola kali; Chenopodium album; Daucus carota; Spergularia media; Desmodium incanum; Avena byzantina; Bromus catharticus; Paspalum dilatatum* and *Rumex acetosella subsp. angiocarpus.*

The species identified on site are illustrated in Table 7.1.

7.1. Discussion

The National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA) lists alien invasive species, which should be controlled. The various NEM:BA categories of alien invasive plant species and their relevant control methods are described below. Refer to Table 7.1 below for the alien invasive species recorded within the study area.

Table 7.1. Inventory of alien invasive plants recorded within the study area

Species name	Common name	NEMBA Category
Acacia mearnsii	Black wattle	Category 2
Argemone mexicana	Mexican poppy	Category 1b
Eucalyptus grandis	Saligna gum	Category 1b
Lantana camara	Lantana	Category 1b
Opuntia ficus indica	Prickly Pear	Category 1b
Pinus elliotii	Slash pine	Category 2
Schefflera elegantissima	False aralia	Category 3
Solanum mauritianum	Bugweed	Category 1b
Taraxacum officinale	Common Daisy	Not listed
Cirsium vulgare	Scottish thistle	Category 1b
Arundo donax	Giant reed	Category 1b
Psidium guajava	Guava	Category 2
Cestrum laevigatum	Inkberry	Category 1b
Ricinus communis	Castor-oil plant	Category 2
Datura stramonium	Common thorn apple	Category 1b
Melia azedarach	Syringa	Category 1b
Eucalyptus camaldulensis	Bluegum or Red river gum	Category 1b

7.1.1. Control of alien invasive species:

- NEMBA Category 1b: must be controlled and wherever possible, removed and destroyed. Trade and planting is prohibited.
- NEMBA Category 2: species deemed to be potentially invasive. A permit is required to carry out a restricted activity. Category 2 includes commercially important species e.g. pine, wattle and gum.
- NEMBA Category 3: may remain in prescribed areas or provinces. Further planting, propagation or trade is prohibited.

Category 1b Listed Invasive Species

Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- growing or in any other way propagating any specimen;
- conveying, moving or otherwise translocating any specimen;
- spreading or allowing the spread of any specimen; and
- releasing any specimen

NEMBA states that;
"(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

Control:

- All Category 1b alien and invasive plant species must be controlled during all phases of development according to the recommendations outline in the Environmental Management Programme (EMPr).

Category 2 Listed Invasive Species

"(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

Control: These invasive species are regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. The Dept. of Transport will not be applying for such permits nor will permits be issued for Cat 2 plants located in riparian zones.

Category 3 Listed Invasive Species

"(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme."

Control methods: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. The Department of Transport will not be applying for such permits nor will permits be issued for Cat 3 plants located in riparian zones.

7.2. Issues identified

The following issues were identified during the Alien and invasive Species assessment:

Table 7.2: Issues identified during the Alien and Invasive Species assessment of the proposed road upgrade and associated mining activities.

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Control of alien plant species	The lack of an effective alien vegetation management plan during construction and rehabilitation may exacerbate the problem of alien plant invasion.

Various alien invasive control measures are recommended in Chapter 8 to reduce the impact of alien invasive plant species within the proposed study area.

8. MANNER IN WHICH THE ENVIRONMENT MAY BE AFFECTED

Appendix 6
Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;

(k) any mitigation measures for inclusion in the EMPr;

8.1. Issues identified

Table 8.1 below list all the issues identified during the assessment of the proposed road upgrade and associated mining sites.

Table 8.1: Technical scope of the impacts identified during all phases of the proposed road upgrade and associated mining activities.

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE			ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	
Environmental Policy	Legal and Policy Compliance	Non-compliance	ECPTA	X	X	X	Obtaining Authorisation from relevant Competent Authorities
Bio-physical	Changes to fluvial geomorphology and hydrology	Earthworks and erosion	Surrounding water courses	X	X		Assessment of the affected watercourses as part of the Aquatic Impact Assessment
	Stormwater and erosion management	Inadequate stormwater management	Surrounding soils and watercourses		X	X	Assesment of the erodibility of the study area as part of the EcIA
	Rehabilitation of disturbed areas	Poor rehabilitation will leave soils vulnerable to loss of fertile top soil.	All disturbed areas around the road footprint and laydown areas.		X	X	
Biological	Natural vegetation	Vegetation clearance	Flora in study area	X	X		Assessment of the vegetation compositions of the study area as part of the EcIA
	Species of Conservation Concern (SCC)	Vegetation clearance	SCC in development footprint		X	*X*	Assessment of the fauna and flora species lists and identification of any potential SCC according to NEMBA, PNCO, CITES and Red Data List.
	Animal disturbances and mortalities	Construction activities and operations	Fauna within the development site and surrounds		X		Assessment of the faunal composition of the study area as part of the EcIA
	Loss/ Fragmentation of habitats	Clearance of vegetation	Habitats within development footprint		X		Assessment of the ecosystems of the study area as part of the EcIA
	Establishment of alien vegetation	Inappropriate planning for management/ rehabilitation of alien vegetation	Disturbed terrestrial and aquatic areas	X	X	X	Assessment of the vegetation compositions of the study area and identification of any potential alien invaders as part of the EcIA.
		Vegetation clearance			X	X	

Ecological impacts that were identified during the Planning and Design, Construction and Operational Phases of the proposed Road upgrade and associated mining activities are described below:

Table 8.2. Impacts identified during all phases of the proposed Road upgrade and associated mining activities.

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
Legal and Policy Compliance	During the planning and design phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	During the operation phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties.
Stormwater and erosion management		During the Construction Phase, loss of soil due to soil erosion and soil compression during construction could lead to an increase in non-permeable surfaces and result in increased storm water runoff.	During the operation phase, failure of the stormwater system and or lack of maintenance of the stormwater system may result in the erosion and or pollution of the surrounding environment should the stormwater be contaminated.
Rehabilitation of disturbed areas		During the construction phase, the poor rehabilitation of impacted areas may lead to erosion of disturbed areas and unnecessary loss of valuable soil.	During the operational phase, the poor rehabilitation of impacted areas may lead to further erosion of disturbed areas and unnecessary loss of valuable soil
Natural vegetation	During the planning and design phase the inappropriate design and demarcation of the road upgrade and associated mining sites will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation including the loss of endangered Mthatha Moist Grassland vegetation and habitat for other taxonomic groups.	
Species of Conservation Concern (SCC)	Prior to construction, the inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	During the construction phase, construction activities associated with the upgrading of the road as well as mining activities may permanently damage or remove plant and animal SCC present on site.	During the operation phase, activities may permanently damage or remove plant SCC present on site.
Animal disturbances and mortalities		During the construction phase, construction activities, vehicles, crew and materials may result in animal fatalities through direct fatalities, habitat destruction, opportunistic hunting, collisions, accidents or baiting and trapping. During the construction phase, blasting may result in disturbances to local livestock communities and wildlife within the study area	
Loss/ Fragmentation of habitats		During construction, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing locales.	

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
Establishment of alien vegetation	During the planning and design phase the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in sensitive areas during the construction and operational phases.	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems	During the operational phase, the poor rehabilitation of disturbed areas may lead to the permanent establishment of alien vegetation.
	During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to the establishment of alien vegetation.	During the construction phase poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	

8.2. Impact assessment

The impacts identified in Section 8.1 are assessed in terms of the criteria described in Section 2.5 and are summarised in Tables 8.3- 8.6 below.

Table 8.3. Assessment of impacts during the Planning & Design Phase

POTENTIAL ISSUES	ROAD ROUTE / MINING SITES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
PLANNING AND DESIGN PHASE														
Environmental Policy														
Legal and policy compliance	BOTH	During the planning and design phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	• All legal matters pertaining to permitting must be completed prior to any construction activity. • A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. • All DEDEAT plant permits must be in place prior to removal or disturbance of SCC.	LOW
Biological Environment														
Natural vegetation	BOTH	During the planning and design phase the inappropriate design and demarcation of the road upgrade and associated mining sites will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	Negative	Direct, Indirect, Cumulative	Severe	Localised	Permanent	Probable	Irreversible	Resource will be lost	Easily Achievable	MODERATE	• The design and layout of the road upgrade and associated mining sites must avoid unnecessary clearance of natural vegetation.	LOW
Species of Conservation Concern	BOTH	Prior to construction, the inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	Negative	Direct, Cumulative	Moderate	Localised	Long-term	Possible	Irreversible	Resource will be partly lost	Easily Achievable	HIGH	• A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. • All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. • The relevant permits must be obtained from the competent authority in order to remove any SCC.	LOW
Control of alien species	BOTH	During the planning and design phase the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in sensitive areas during the construction and operational phases.	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will not be lost	Easily Achievable	MODERATE	• An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. • The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. • Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.	LOW
		During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to the establishment of alien vegetation.	Negative	Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE		LOW

Table 8.4. Assessment of impacts during the Construction Phase

POTENTIAL ISSUES	ROAD ROUTE/ MINING SITES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
CONSTRUCTION PHASE														
Environmental Policy														
Legal and policy compliance	BOTH	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	• The Applicant must employ an independent Environmental Control Officer (ECO) for the duration of the construction phase to audit the contractors compliance with the specifications in the EA, EMPr and any other permits/authorisations.	LOW
Biophysical Environment														
Stormwater and erosion management	BOTH	During the Construction Phase, loss of soil due to soil erosion and soil compression during construction could lead to an increase in non-permeable surfaces and result in increased storm water runoff.	Negative	Direct	Severe	Study area	Short-term	Probable	Reversible	Resource will be partly lost	Easily Achievable	MODERATE	• A stormwater management plan must be implemented during the construction phase. • Ensure that appropriate stormwater structures are designed prior to construction and implemented during construction. • Ongoing soil loosening and re-vegetation efforts must be employed on compacted areas throughout the construction phase. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. • Develop and implement an Erosion Action Plan that aims to monitor and respond to erosion events. • Rehabilitate disturbed areas as soon as possible after construction; • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance; • All cleared areas (not used for the development footprint) must be vegetated with indigenous natural vegetation. • Natural vegetation (scrubs & trees) that was removed onsite on must be placed on cleared areas for soil stabilisation efforts.	LOW
Rehabilitation of disturbed areas	BOTH	During the construction phase, the poor rehabilitation of impacted areas may lead to erosion of disturbed areas and unnecessary loss of fertile soil.	Negative	Direct, Indirect, Cumulative	Moderately severe	Study area	Long-term	Probable	Reversible	Resource will be partly lost	Achievable	MODERATE	• Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion Management Plans.	LOW
Biological Environment														

POTENTIAL ISSUES	ROAD ROUTE/ MINING SITES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
CONSTRUCTION PHASE														
Natural vegetation	BOTH	During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation including the loss of endangered Mthatha Moist Grassland vegetation and habitat for other taxonomic groups.	Negative	Direct, indirect, cumulative	Severe	Study area	Permanent	Possible	Reversible	Resource will be partly lost	Achievable	MODERATE	• The construction footprint must be surveyed and demarcated prior to construction commencing. • No construction activities must occur outside the demarcated footprint. • Construction activities must be preferred in areas where degraded natural vegetation is found. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. • Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. • The contractor's staff must not harvest any natural vegetation.	LOW
Species of Conservation Concern (SCC)	BOTH	During the construction phase, construction activities associated with the upgrading of the road as well as mining activities may permanently damage or remove plant and animal SCC present on site.	Negative	Direct	Severe	Localised	Permanent	Probable	Irreversible	Resource be partly lost	Easily Achievable	HIGH	• A search and rescue operation must be conducted by the relevant authority prior to commencement of construction activities. • All SCC impacted by construction activities must be conserved and rescued. • All rescued SCC must be transplanted to a suitable habitat or nursery for the duration of the construction phase; • All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation	LOW
Animal disturbances and mortalities	BOTH	During the construction phase, construction activities, vehicles, crew and materials may result in animal fatalities through direct fatalities, habitat destruction, opportunistic hunting, collisions, accidents or baiting and trapping.	Negative	Direct	Severe	Localised	Permanent	Possible	Irreversible	Resource will be partly lost	Achievable	HIGH	• Train all staff on site regarding the proper management and response should animals be encountered. • A specialist must be appointed to search and relocate animals in the construction region prior to work commencing, • No hunting, baiting or trapping must be allowed.	LOW
	MINING SITES	During the construction phase, blasting may result in disturbances to local livestock communities and wildlife within the study area	Negative	Direct, Indirect	Severe	Study area	Permanent	Probable	Irreversible	Resource will be	Achievable	HIGH	• All livestock must be moved outside of the blasting zone prior to blasting commencing. • All wildlife found within the blasting area must be removed and relocated prior to blasting commencing.	LOW
Loss/ Fragmentation of habitats	BOTH	During construction, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing locales.	Negative	Direct	Moderate	Study area	Long-term	Possible	Irreversible	Resource will be	Achievable	MODERATE	• Vegetation clearance and aquatic habitats must be avoided as far as possible; • Should avoidance be impractical, harm to the environment must be minimised as far as possible.	LOW
Establishments of alien plant species	BOTH	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems	Negative	Indirect	Severe	Study area	Long-term	Probable	Reversible	Resource will not be lost	Achievable	HIGH	• The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.	LOW

POTENTIAL ISSUES	ROAD ROUTE/ MINING SITES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
CONSTRUCTION PHASE														
	BOTH	During the construction phase poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Negative	Direct, indirect, cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource may be partly lost	Achievable	MODERATE	• All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.	LOW

Table 8.5. Assessment of impacts during the Operational Phase

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
OPERATION PHASE														
Environmental Policy														
Legal and policy compliance	BOTH	During the operation phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	MODERATE	• The proponent must ensure that Road upgrade process and associated mining activities are compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, WULA, plant removal permits and any other permits/authorisations.	LOW
Biophysical Environment														
Stormwater and erosion management	ROAD	During the operation phase, failure of the stormwater system and or lack of maintenance of the stormwater system may result in the erosion and or pollution of the surrounding environment should the stormwater be contaminated.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	• Stormwater management structures must be monitored and maintained throughout the operation phase.	LOW
Rehabilitation of disturbed areas	BOTH	During the operational phase, the poor rehabilitation of impacted areas may lead to further erosion of disturbed areas and unnecessary loss of valuable soil	Negative	Direct, Indirect,	Moderate	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	MODERATE	• All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied that all affected areas have been rehabilitated.	LOW
Biological environment														

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
		(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
OPERATION PHASE														
Establishment of alien vegetation	BOTH	During the operational phase, the poor rehabilitation of disturbed areas may lead to the permanent establishment of alien vegetation.	Negative	Direct, indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE	• The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.	LOW

Table 8.6. Assessment of the No-Go alternative

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	(SIGNIFICANCE WITHOUT MITIGATION)											(SIGNIFICANCE WITH MITIGATION)	
Biophysical environment													
No development for the road upgrade and associated mining sites	Should the project not proceed, the current land use will remain the same (grassland) and the current state of erosion within the project area will remain.	Negative	Indirect, cumulative	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	LOW	• No mitigation required.	LOW
Biological Environment													
No development for the road upgrade and associated mining sites	Should the project not proceed, the current land use will remain the same (grassland). There will be no vegetation removal and therefore no unnecessary loss of natural vegetation or SCC due to road upgrade activities.	Positive	Indirect, cumulative	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	• No mitigation required.	MODERATE

9. IMPACT STATEMENT, RECOMMENDATIONS AND CONCLUSION

Appendix 6
Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion—
(i) whether the proposed activity, activities or portions thereof should be authorised;
(iA) regarding the acceptability of the proposed activity or activities; and
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

9.1. Impact statement

The proposed road upgrade will include the upgrading of a 20km stretch of road with a total width of approximately 30m. The upgrade will also include the use of three borrow pits that will each not exceed 5ha in size and one quarry of approximately 7ha in size. The proposed upgrade and associated mining activities will inevitably effect both the vegetation and aquatic environments of the study area. No severe, irreversible impacts associated with the proposed road upgrade of mining sites have been identified and therefore the proposed project poses no fatal flaws.

Vegetation
A total of 13 indigenous plant species were found within the proposed development area, however the majority of the study area was dominated by grasses (specifically *Sporobolus Africana*) and the *Eriocephalus africanus* shrub. As discussed in section 5 of this study, certain portions of the study area were dominated by patches of *Aloe sp.* and patches of alien plant species. The overall condition of the grassland vegetation within the study area indicated a degree of disturbance, probably by human activities, livestock grazing and human settlements. Management of the alien invasive plant species during the road upgrading and mining activities is essential to ensure that the existing state of the environment is not worsened by the proposed development. Also, the relocation of Aloe plants to other suitable sites will be required.

Alien species present on site and their category according to the NEMBA Alien and Invasive Species Regulations (published 1 August 2014) are presented in Section 7 above. It is advised that an Alien Vegetation Management Plan is generated and implemented during the construction phase (for clearing) and operation phase (for maintenance), throughout the life of the project, and that active management of alien species is carried out.

Aquatic environment
The proposed road upgrade and associated mining activities will affect a number of water crossings. It includes the upgrading of two bridges for the Tora and Bholotwa river crossing and one causeway for the Mgwali river crossing. Furthermore, the road route, as well as two of the proposed mining sites, falls within numerous natural and artificial wetland buffers. According to the NFEPA wetland map the road upgrade will not directly impact any wetlands. The impacts on the aquatic environment will be assessed in greater detail during the Aquatic Impact Assessment conducted for the proposed road upgrade.

Erosion and soils

It was observed that the proposed road upgrade portion and associated mining sites occur in area that demonstrated a high degree of erodibility of the soils. The woody and herbaceous vegetation component found in borrow pit C and the quarry site indicate greater soil stability. These observations were confirmed by the desktop study such that the majority of the road upgrade falls within soils classified as "Soils with a marked clay accumulation". A high percentage of clay is characteristic of erodible soils. The borrow pit C and quarry site however were classified as areas with soils of minimal development and this can be use to explain the variation in vegetation composition of the two sites. Caution must be practised in the form of erosion control measures throughout the duration of the road upgrade process.

9.1.1. Existng impacts

A baseline analysis of the present condition of the study area indicated the presence of alien invasive plant species and erosion prone areas as existing impacts on the development site.

9.1.2. Cumulative impact

The following cumulative impacts were identified as a result of the proposed road upgrade and associated mining activities.

Theme	Description of Impact	Cumulative impact
Natural vegetation	Inappropriate design of the project infrastructure and demarcation of project boundaries as well as the clearance of natural vegetation outside of the demarcated project boundary will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	Loss of ecosystems and ecological infrastructure through direct physical removal and indirect impacts on ecological infrastructure.
Species of Conservation Concern	The inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	Permanent loss of SCC. Delays in development/ operational processes due to the non-compliances issued.
Rehabilitation of disturbed areas	Inadequate planning for rehabilitation and failing to implement ongoing rehabilitation measures during construction may lead to degradation of the study area and establishment of alien invasive vegetation.	Disturbance to the riparian vegetation due to alien plant species infestation, erosion of the river banks and sedimentation of the watercourse may result in the long term degradation of the natural environment of the study area and surrounds.
Establishments of alien plant species	The removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems. Together with poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Establishment of alien invasive vegetation and permanent degradation of the ecosystems.

9.1.3. No-Go areas

The development site (including temporary impacted areas such as site camps and laydown areas) must be demarcated prior to commencement of construction and the site location approved by the appointed ECO. All areas outside the approved demarcation must be considered as NO-GO areas. All areas indicated to contain SCC must be considered NO-GO areas until necessary permits are obtained for their removal.

9.1.4. Alternatives

The preferred alternative was the only alternative assessed for the proposed road upgrade and associated mining sites.

9.2. Recommendation

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- A qualified, independent ECO must be appointed prior to commencement of any activity on site.
- All mitigation measures indicated in this report must be included into the EMPr
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans must be incorporated into the EMPr:
    - Storm Water & Contingency Management Plan;
    - Erosion Action Plan;
    - Rehabilitation Management Plan; and
    - Alien Vegetation Management Plan

9.2.1. Mitigation measures

All the mitigation measures provided below are to be implemented during the planning and design, construction and operational phases of the proposed road upgrade and associated mining activities.

Planning and Design Phase

RISK	MITIGATION MEASURES
Legal and policy compliance	• All legal matters pertaining to permitting must be completed prior to any construction activity. • A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. • All DEDEAT plant permits must be in place prior to removal or disturbance of SCC.
Natural vegetation	• The design and layout of the road upgrade and associated mining sites must avoid unnecessary clearance of natural vegetation.

Species of Conservation Concern	• A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. • All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. • The relevant permits must be obtained from the competent authority in order to remove any SCC.
Control of alien species	• An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. • The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. • Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.

Construction Phase

RISK	MITIGATIION MEASURES
Legal and policy compliance	• The Applicant must employ an independent Environmental Control Officer (ECO) for the duration of the construction phase to audit the contractors compliance with the specifications in the EA, EMPr and any other permits/authorisations.
Stormwater and erosion management	• A stormwater management plan must be implemented during the construction phase. • Ensure that appropriate stormwater structures are designed prior to construction and implemented during construction. • Ongoing soil loosening and re-vegetation efforts must be employed on compacted areas throughout the construction phase. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. • Develop and implement an Erosion Action Plan that aims to monitor and respond to erosion events. • Rehabilitate disturbed areas as soon as possible after construction; • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance; • All cleared areas (not used for the development footprint) must be vegetated with indigenous natural vegetation. • Natural vegetation (scrubs & trees) that was removed onsite on must be placed on cleared areas for soil stabilisation efforts.
Rehabilitation of disturbed areas	• Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of

	work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion Management Plans.
Natural vegetation	• The construction footprint must be surveyed and demarcated prior to construction commencing. • No construction activities must occur outside the demarcated footprint. • Construction activities must be preferred in areas where degraded natural vegetation is found. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. • Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. • The contractor's staff must not harvest any natural vegetation.
Species of Conservation Concern (SCC)	• A search and rescue operation must be conducted by the relevant authority prior to commencement of construction activities. • All SCC impacted by construction activities must be conserved and rescued. • All rescued SCC must be transplanted to a suitable habitat or nursery for the duration of the construction phase; • All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation
Animal disturbances and mortalities	• Train all staff on site regarding the proper management and response should animals be encountered. • A specialist must be appointed to search and relocate animals in the construction region prior to work commencing, • No hunting, baiting or trapping must be allowed. • All livestock must be moved outside of the blasting zone prior to blasting commencing. • All wildlife found within the blasting area must be removed and relocated prior to blasting commencing.
Loss/ Fragmentation of habitats	• Vegetation clearance and aquatic habitats must be avoided as far as possible; • Should avoidance be impractical, harm to the environment must be minimised as far as possible.
Establishments of alien plant species	• The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.

	• Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.

Operational Phase

RISK	MITIGATION MEASURE
Legal and policy compliance	• The proponent must ensure that Road upgrade process and associated mining activities are compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, WULA, plant removal permits and any other permits/authorisations.
Stormwater and erosion management	• Stormwater management structures must be monitored and maintained throughout the operation phase.
Rehabilitation of disturbed areas	• All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied that all affected areas have been rehabilitated.
Establishment of alien vegetation	• The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.

9.3. Conclusion

Table 9.1 summarises the change in impacts from pre- to post- mitigation during development of the proposed Road upgrade and associated mining activities. The majority of the impacts were identified as moderate and high, and will be reduced to a low significance if the mitigation measures as proposed in this report are adhered to.

Table 9.1: Assessment of pre- and post-mitigation impact significance.

	PRE-MITIGATION			POST-MITIGATION		
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
Planning and Design	0	4	2	6	0	0
Construction	0	5	8	13	0	0
Operational	0	3	2	5	0	0
No-Go	1	1+	0	1	1+	0
TOTAL	1	12;1+	12	25	1+	0

9.3.1. Ecological Statement and Opinion of the Specialist

The ecological impacts of all aspects for the proposed road upgrade and associated mining activities were assessed and considered to be ecologically acceptable, provided that mitigation measures outlined in this report are implemented. In total 46% of the impacts are rated as MODERATE NEGATIVE pre-mitigation (Table 9.1), and 46% as HIGH NEGATIVE, **therefore implementation of recommended mitigation measures, coupled with rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy**. Implementing the recommended mitigations measures will reduce overall impacts from MODERATE and HIGH to 96% LOW NEGATIVE, 4% MODERATE POSITIVE.

All regions demarcated as HIGH sensitivity in Section 6 of this report should be avoided as far as possible and if avoidance is not possible, caution and strict adherence to mitigation measures must be applied to these areas. The application of the appropriate mitigation measures provided in Section 8 for these sensitive areas and high negative impacts is of critical importance for the integrity of the environment and are to be sustained throughout the road upgrade process and mining activities. Specific mitigations are required for any plant SCC and/or communities identified onsite.

Minor location deviations from the proposed works are deemed acceptable provided that they are approved by the appointed ECO and the recommended mitigation measures contained in this report are implemented for such deviations.

The proposed development is **NOT considered to be Fatally Flawed**. The **No-Go option** refers to the proposed Road upgrade not being developed. This option will therefore have a moderately positive outcome for the natural vegetation and aquatic environment of the affected area, but the negative impacts in terms of road safety, inadequate stormwater management, erosion and the poor condition of the road will remain.

10. REFERENCES

ANIMAL DEMOGRAPHY UNIT. 2016. Summary Data of the Frogs of South Africa, Lesotho and Swaziland. Animal Demography Unit, Department of Zoology, University of Cape Town. Downloaded from: http://adu.org.za/frog_atlas.php; accessed on 18/05/2018

ACOCKS, J.P.H. 1953, 1988. Veld types of South Africa. Memoir of the Botanical Survey of South Africa 57: 1-146.

APPS, P. (Ed.) 2000. Smither's Mammals of Southern Africa: A Field Guide. Struik publishers, Cape Town.

BRANCH, B. 1994. Field guide to the snakes and other reptiles of Southern Africa. Struik publishers, Cape Town.

CAPE. 2011. Cape Action for the People and the Environment. The Cape Floristic Region. www.capeaction.org.za/index.php/what-is-cape/the-cape-floristic-region (December 2012).

CARA. 1983. Conservation of Agricultural Resouces Act No. 43 of 1983.

DRIVER, M., RAIMONDO, D., MAZE, K., PFAB, M.F. and HELME, N.A. 2009. Applications of the Red List for conservation practitioners. In: D. Raimondo, L. Von Staden, W. Foden, J.E. Victor, N.A. Helme, R.C. Turner, D.A. Kamundi and P.A. Manyama (eds). Red List of South African Plants. Strelitzia 25:41-52. South African National Biodiversity Institute, Pretoria.

DRIVER, A. *et al*. 2011. National Biodiversity Assessment 2011: an assessment of South Africa's biodiversity and ecosystems. Synthesis Report. SANBI and DEAT, Pretoria.

EASTERN CAPE STATE OF THE ENVIRONMENT REPORT. 2004.

GERMISHUIZEN, G. & MEYER, N.L. (Eds). 2003. Plants of southern Africa: an annotated checklist. Strelitzia 14. NBI, Pretoria.

GERMISHUIZEN, G., MEYER, N.L. STEENKAMP, Y. & KIETH, M. (Eds). 2006. A checklist of South African plants. SABONET Report no 41. Pretoria

GOLDING, J. (Ed.). 2002. Southern African Plant Red Data Lists. Southern African Botanical Diversity Network report no. 14. National Botanical Institute, Pretoria.

GROBLER, A., VLOK, J., COWLING, R., VAN DER MERWE, S., SKOWNO, A. L., & DAYARAM, A. 2018. Technical Report: Integration of the Subtropical Thicket Ecosystem Project (STEP) vegetation types into the VEGMAP national vegetation map 2018.

IUCN. 2012. Red List of Threatened Species. IUCN Species Survival Commission, Cambridge Available: http://www.iucnredlist.org/ (Accessed 03/03/2017).

JORDAAN, M., IMPSON, D., & VAN DER WALT, R. 2012. Freshwater Fishes. In Turner AA (Ed.). Western Cape Province State of Biodiversity 2012. CapeNature Scientific Services. Stellenbosch.

KRUG, C. B. 2004. Practical Guidelines for the Restoration of Renosterveld [online]. Available from http://awsassets.wwf.org.za/downloads/rv_restoration_guidelines.pdf [Accessed 6 January 2016].
LOW, A & REBELO, A. 1998. Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs & Tourism, Pretoria.

MANGHARA, P., KAKEMBO, V., & LIM, K. J. 2012. Soil erosion risk assessment of the Keiskamma catchment, South Africa using GIS and remote sensing. *Environmental Earth Science*, *65*, 2087-2102.

MILTON-DEAN, S. 2011a. Road-verge Vegetation Management Guidelines for Eden District Municipality. Balancing road safety, infrastructure maintenance and biodiversity conservation in roadside vegetation management [online]. Available from http://gouritz.com/wp-content/uploads/2012/06/Handbook-on-roadside-biodiversity-management-Milton-Dean-2011.pdf [Accessed 22.01.2016].

MUCINA, L. & RUTHERFORD, M.C. 2012. The vegetation of South Africa, Lesotho and Swaziland. SANBI, Pretoria.

Nature Conservation Ordinance NO 19 of 1974

NEM:BA. 2004. National Environmental Management Act: Biodiversity Act (No. 10 of 2004).

NEM:BA. 2011. National list of ecosystems that are threatened and in need of protection. Government Notice No. 1002, 9 December 2011.

NEM:BA. 2014. National Environmental Management Act: Biodiversity Act (No. 10 of 2004) – Draft Alien and Invasive Species lists, 2014. Government Gazette, No. 37320, 12 February 2014.

NFA. 1998. National Forests Act (No. 84 of 1998).

NFA. 2013. List of protected trees: Notice of the list of protected tree species under the National Forest Act (No. 84 of 1998). Government Gazette No 37037, Notice 877, 22 November 2013.

(Pierce et al. 2005

RAIMONDO, D. *et al.* (eds) 2009. Red lists of South African plants 2009. Strelitzia 25. SANBI, Pretoria.

SANBI. 2006-2018. The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018.

SANBI. 2018. *Vachellia Karroo.* Accessed from http://pza.sanbi.org/vachellia-karroo on 8 October 2018. South African National Biodiversity Institute.

STEENKAMP, E. J. 2015. A profile on the aloe industry for export: A focus on South Africa [online]. Available from http://www.nda.agric.za/doaDev/sideMenu/internationalTrade/docs/tradeFacilitation/Aloe_%2024%20April%202015_high.pdf [Accessed 18.01.2016].

STUART, C & STUART, T. 2007. Field Guide to Mammals of Southern Africa. Struik Nature, Cape Town.

TURNER, A. A., & DE VILLIERS, A. 2012. *Western Cape Province State of Biodiversity 2012.* CapeNature Scientific Services. Stellenbosch.

Western Cape State of the Environment Report. 2013. Western Cape Government: Environmental Affairs and Development Planning.

11. APPENDIX 1 – LIST OF ANIMAL SPECIES

The following lists of animal species (birds, amphibians, reptiles and mammals) have distribution ranges that include the proposed road upgrade study area.

Birds (Source: http://sabap2.adu.org.za/ 09/05/2018)***:***

Common group	Common name	*Species name*	Red data list IUCN	PNCO
Finch	Red-headed	*Amadina erythrocephala*	Least Concern	Schedule 2: Protected Wild Animals
Greenbul	Sombre	*Andropadus importunus*	Least Concern	Schedule 2: Protected Wild Animals
Pipit	African	*Anthus cinnamomeus*	Least Concern	Schedule 2: Protected Wild Animals
Apalis	Bar-throated	*Apalis thoracica*	Least Concern	Schedule 2: Protected Wild Animals
Swift	White-rumped	*Apus caffer*	Least Concern	Schedule 2: Protected Wild Animals
Eagle	Verreaux's	*Aquila verreauxii*	Least Concern	Schedule 2: Protected Wild Animals
Crane	Grey Crowned	*Balearica regulorum*	Endangered	Schedule 2: Protected Wild Animals
Batis	Cape	*Batis capensis*	Least Concern	Schedule 2: Protected Wild Animals
Batis	Chinspot	*Batis molitor*	Least Concern	Schedule 2: Protected Wild Animals
Ibis	Hadeda	*Bostrychia hagedash*	Least Concern	Schedule 2: Protected Wild Animals
Egret	Cattle	*Bubulcus ibis*	Least Concern	Schedule 2: Protected Wild Animals
Buzzard	Jackal	*Buteo rufofuscus*	Least Concern	Schedule 2: Protected Wild Animals
Buzzard	Steppe	*Buteo vulpinus*		Schedule 2: Protected Wild Animals
Lark	Red-capped	*Calandrella cinerea*	Least Concern	Schedule 2: Protected Wild Animals
Camaroptera	Green-backed	*Camaroptera brachyura*	Least Concern	Schedule 2: Protected Wild Animals
Chat	Familiar	*Cercomela familiaris*	Least Concern	Schedule 2: Protected Wild Animals
Sunbird	Amethyst	*Chalcomitra amethystina*	Least Concern	Schedule 2: Protected Wild Animals
Cuckoo	Diderick	*Chrysococcyx caprius*	Least Concern	Schedule 2: Protected Wild Animals
Starling	Violet-backed	*Cinnyricinclus leucogaster*	Least Concern	Schedule 2: Protected Wild Animals
Sunbird	Greater Double-collared	*Cinnyris afer*	Least Concern	Schedule 2: Protected Wild Animals
Sunbird	Southern Double-collared	*Cinnyris chalybeus*	Least Concern	Schedule 2: Protected Wild Animals
Harrier	Black	*Circus maurus*	Endangered	Schedule 2: Protected Wild Animals
Neddicky	Neddicky	*Cisticola fulvicapilla*	Least Concern	Schedule 2: Protected Wild Animals
Cisticola	Levaillant's	*Cisticola tinniens*	Least Concern	Schedule 2: Protected Wild Animals
Mousebird	Speckled	*Colius striatus*	Least Concern	Schedule 2: Protected Wild Animals
Olive-pigeon	African	*Columba arquatrix*	Least Concern	Schedule 2: Protected Wild Animals
Pigeon	Speckled	*Columba guinea*	Least Concern	Schedule 2: Protected Wild Animals
Raven	White-necked	*Corvus albicollis*	Least Concern	Schedule 2: Protected Wild Animals

Crow	Pied	*Corvus albus*	Least Concern	
Crow	Cape	*Corvus capensis*	Least Concern	
Robin-chat	Cape	*Cossypha caffra*	Least Concern	Schedule 2: Protected Wild Animals
Seedeater	Streaky-headed	*Crithagra gularis*	Least Concern	Schedule 2: Protected Wild Animals
Canary	Yellow-fronted	*Crithagra mozambicus*		Schedule 2: Protected Wild Animals
Canary	Brimstone	*Crithagra sulphuratus*		Schedule 2: Protected Wild Animals
Cuckoo	Red-chested	*Cuculus solitarius*	Least Concern	Schedule 2: Protected Wild Animals
Drongo	Fork-tailed	*Dicrurus adsimilis*	Least Concern	Schedule 2: Protected Wild Animals
Falcon	Lanner	*Falco biarmicus*	Least Concern	Schedule 2: Protected Wild Animals
Kestrel	Rock	*Falco rupicolus*		Schedule 2: Protected Wild Animals
Vulture	Cape	*Gyps coprotheres*	Endangered	Schedule 2: Protected Wild Animals
Swallow	Greater Striped	*Hirundo cucullata*	Least Concern	Schedule 2: Protected Wild Animals
Martin	Rock	*Hirundo fuligula*		Schedule 2: Protected Wild Animals
Wryneck	Red-throated	*Jynx ruficollis*	Least Concern	Schedule 2: Protected Wild Animals
Starling	Cape Glossy	*Lamprotornis nitens*	Least Concern	Schedule 2: Protected Wild Animals
Boubou	Southern	*Laniarius ferrugineus*	Least Concern	Schedule 2: Protected Wild Animals
Fiscal	Common (Southern)	*Lanius collaris*	Least Concern	Schedule 2: Protected Wild Animals
Barbet	Black-collared	*Lybius torquatus*	Least Concern	Schedule 2: Protected Wild Animals
Longclaw	Cape	*Macronyx capensis*	Least Concern	Schedule 2: Protected Wild Animals
Kite	Yellow-billed	*Milvus aegyptius*		Schedule 2: Protected Wild Animals
Lark	Rufous-naped	*Mirafra africana*	Least Concern	Schedule 2: Protected Wild Animals
Rock-thrush	Cape	*Monticola rupestris*	Least Concern	Schedule 2: Protected Wild Animals
Wagtail	Cape	*Motacilla capensis*	Least Concern	Schedule 2: Protected Wild Animals
Flycatcher	African Dusky	*Muscicapa adusta*	Least Concern	Schedule 2: Protected Wild Animals
Sunbird	Malachite	*Nectarinia famosa*	Least Concern	Schedule 2: Protected Wild Animals
Chat	Buff-streaked	*Oenanthe bifasciata*		Schedule 2: Protected Wild Animals
Wheatear	Mountain	*Oenanthe monticola*	Least Concern	Schedule 2: Protected Wild Animals
Starling	Red-winged	*Onychognathus morio*		
Oriole	Black-headed	*Oriolus larvatus*	Least Concern	Schedule 2: Protected Wild Animals
Sparrow	Southern Grey-headed	*Passer diffusus*	Least Concern	Schedule 2: Protected Wild Animals
Sparrow	House	*Passer domesticus*	Least Concern	
Sparrow	Cape	*Passer melanurus*	Least Concern	
Spoonbill	African	*Platalea alba*	Least Concern	Schedule 2: Protected Wild Animals
Tinkerbird	Red-fronted	*Pogoniulus pusillus*	Least Concern	Schedule 2: Protected Wild Animals
Prinia	Karoo	*Prinia maculosa*	Least Concern	Schedule 2: Protected Wild Animals

Honeybird	Brown-backed	*Prodotiscus regulus*	Least Concern	Schedule 2: Protected Wild Animals
Saw-wing	Black (Southern race)	*Psalidoprocne holomelaena*		Schedule 2: Protected Wild Animals
Bulbul	Dark-capped	*Pycnonotus tricolor*		Schedule 2: Protected Wild Animals
Martin	Brown-throated	*Riparia paludicola*	Least Concern	Schedule 2: Protected Wild Animals
Stonechat	African	*Saxicola torquatus*	Least Concern	Schedule 2: Protected Wild Animals
Hamerkop	Hamerkop	*Scopus umbretta*	Least Concern	Schedule 2: Protected Wild Animals
Canary	Cape	*Serinus canicollis*	Least Concern	Schedule 2: Protected Wild Animals
Flycatcher	Fiscal	*Sigelus silens*	Least Concern	Schedule 2: Protected Wild Animals
Turtle-dove	Cape	*Streptopelia capicola*	Least Concern	Schedule 2: Protected Wild Animals
Dove	Red-eyed	*Streptopelia semitorquata*	Least Concern	Schedule 2: Protected Wild Animals
Starling	Common	*Sturnus vulgaris*	Least Concern	
Bush-shrike	Olive	*Telophorus olivaceus*	Least Concern	Schedule 2: Protected Wild Animals
Bokmakierie	Bokmakierie	*Telophorus zeylonus*	Least Concern	Schedule 2: Protected Wild Animals
Hornbill	Crowned	*Tockus alboterminatus*	Least Concern	Schedule 2: Protected Wild Animals
Thrush	Olive	*Turdus olivaceus*	Least Concern	Schedule 2: Protected Wild Animals
Hoopoe	African	*Upupa africana*		Schedule 2: Protected Wild Animals
Mousebird	Red-faced	*Urocolius indicus*	Least Concern	Schedule 2: Protected Wild Animals
Whydah	Pin-tailed	*Vidua macroura*	Least Concern	Schedule 2: Protected Wild Animals
White-eye	Cape	*Zosterops virens*	Least Concern	Schedule 2: Protected Wild Animals

Reptiles (Source: Branch, 1996)**:**

Common Name	Species Name		IUCN
Marsh or Helmeted Terrapin	*Pelomedusa*	*subrufa*	
Bibron's Blind Snake	*Typhlops*	*bibronii*	
Cape Thread Snake	*Leptotyphlops*	*conjunctus*	
Dusky-bellied Water Snake	*Lycodonomorphus*	*laevissimus*	IUCN Red List; Least Concern
Common Brown Water Snake	*Lycodonomorphus*	*rufulus*	
Brown House Snake	*Lamprophis*	*fuliginosus*	
Olive House Snake	*Lamprophis*	*inornatus*	IUCN Red List; Least Concern
Spotted House Snake	*Lamprophis*	*guttatus*	IUCN Red List; Least Concern
Aurora House Snake	*Lamprophis*	*aurora*	IUCN Red List; Least Concern
Cape Wolf Snake	*lycophidion*	*capense*	IUCN Red List; Least Concern
Common Slug Eater	*Duberria*	*lutrix*	IUCN Red List; Least Concern
Mole Snake	*Pseudaspis*	*cana*	
Spotted or Rhombic Skaapsteker	*Psammophylax*	*rhombeatus*	
Cross-marked or Montane Grass Snake	*Psammophis*	*crucifer*	IUCN Red List; Least Concern
Cape Centipede Eater	*Aparallactus*	*capensis*	IUCN Red List; Least Concern

Spotted Harlequin Snake	*Homoroselaps*	*lacteus*	IUCN Red List; Least Concern
Spotted Bush Snake	*Philothamnus*	*semivariegatus*	
Natal Green Snake	*Philothamnus*	*occidentalis*	IUCN Red List; Least Concern
Common or Rhombic Egg Eater	*Dasypeltis*	*scabra*	IUCN Red List; Least Concern
Southern Brown Egg Eater	*Dasypeltis*	*inornata*	IUCN Red List; Least Concern
Herald or Red-lipped Snake	*Crotaphopeltis*	*hotamboeia*	
Boomslang	*Dispholidus*	*typus*	
Cape Cobra	*Naja*	*nivea*	
Rinkhals	*Hemachatus*	*haemachatus*	IUCN Red List; Least Concern
Common or Rhombic Night Adder	*Causus*	*rhombeatus*	
Puff Adder	*Bitis*	*arietans*	
Cape Legless Skink	*Acontias*	*meleagris*	IUCN Red List; Least Concern
Cape Skink	*Mabuya*	*capensis*	
Red-sided Skink	*Mabuya*	*homalocephala*	IUCN Red List; Least Concern
Variable Skink	*Mabuya*	*varia*	
Delalande's Sandveld Lizard	*Nucras*	*lalandii*	IUCN Red List; Least Concern
Yellow-throated Plated Lizard	*Gerrhosaurus*	*flavigularis*	
Drakensberg Crag Lizard	*Pseudocordylus*	*langi*	IUCN Red List; Least Concern
Rock or White-throated Monitor	*Varanus*	*exanthematicus*	IUCN Red List; Least Concern
Southern Rock Agama	*Agama*	*atra*	IUCN Red List; Least Concern
Spotted Gecko	*Pachydactylus*	*maculatus*	IUCN Red List; Least Concern

Mammals (Source: Apps, 2000)

Common Name	Species Name		IUCN
Straw coloured fruit bat	*Eidolon*	*helvum*	IUCN Red List; Near Threatened
Egyptian Fruit Bat	*Rousettus*	*aegyptiacus*	IUCN Red List; Least Conern
Tomb Bat	*Taphozous*	*mauritianus*	
Egyptian Free-Tailed Bat	*Tadarida*	*aegyptiaca*	IUCN Red List; Least Conern
Schreibers' Long-Fingered Bat	*Miniopterus*	*schreibersii*	IUCN Red List; Near Threatened
Temminck's Hairy Bat	*Myotis*	*tricolor*	IUCN Red List; Least Conern
Banana Bat	*Pipistrellus*	*nanus*	IUCN Red List; Least Conern
Cape Serotine Bat	*Eptisecus*	*capensis*	
Yellow House Bat	*Scotophilus*	*dinganii*	IUCN Red List; Least Conern
Common Slit-Faced Bat	*Nycteris*	*thebaica*	IUCN Red List; Least Conern
Geoffroy's Horseshoe Bat	*Rhinolophus*	*clivosus*	IUCN Red List; Least Conern
Forest Shrew	*Myosorex*	*varius*	IUCN Red List; Least Conern
Greater Red Musk Shrew	*Crocidura*	*flavescens*	IUCN Red List; Least Conern
Giant Golden Mole	*Chrysospalax*	*trevelyani*	IUCN Red List; Endangered
Hottentot Golden Mole	*Amblysomus*	*septentrionalis*	IUCN Red List; Near Threatened
Striped Mouse	*Rhabdomys*	*pumilio*	IUCN Red List; Least Conern
Water Rat	*Dasymys*	*incomtus*	IUCN Red List; Least Conern
Woodland Mouse	*Grammomys*	*dolichurus*	IUCN Red List; Least Conern
House Mouse	*Mus*	*domesticus*	IUCN Red List; Least Conern

Pygmy Mouse	*Mus*	*minutoides*	IUCN Red List; Least Conern
Multimammate Mouse	*Mastomys*	*natalensis/coucha*	IUCN Red List; Least Conern
Namaqua Rock Mouse	*Aethomys*	*namaquensis*	IUCN Red List; Least Conern
Red Veld Rat	*Aethomys*	*chrysophilus*	IUCN Red List; Least Conern
House Rat/ Roof Rat/ Black Rat	*Rattus*	*rattus*	IUCN Red List; Least Conern
White Tailed Mouse	*Mystromys*	*albicaudatus*	IUCN Red List; Vulnerable
Grey Climbing Mouse	*Dendromus*	*melanotis*	IUCN Red List; Least Conern
Brants' Climbing Mouse	*Dendromus*	*mesomelas*	IUCN Red List; Least Conern
Greater Canerat	*Thryonomys*	*swinderianus*	IUCN Red List; Least Conern
WoodLand Dormouse	*Graphiurus*	*murinus*	IUCN Red List; Least Conern
Common Mole-Rat	*Cryptomys*	*hottemtotus/darlingi*	IUCN Red List; Least Conern
Porcupine	*Hystrix*	*africaeaustralis*	IUCN Red List; Least Conern
Scrub Hare	*Lepus*	*saxatilis*	IUCN Red List; Least Conern
Natal Red Rock Rabbit	*Pronolagus*	*crassicaudatus*	IUCN Red List; Least Conern
Rock Dassie/ Rock Hyrax	*Procavia*	*capensis*	IUCN Red List; Least Conern
Tree Dassie/ Tree Hyrax	*Dendrohyrax*	*arboreus*	IUCN Red List; Least Conern
Bushpig	*Potamochoerus*	*porcus*	IUCN Red List; Least Conern
Common Duiker/ Grey Duiker	*Sylvicapra*	*grimmia*	IUCN Red List; Least Conern
Bushbuck	*Tragelaphus*	*scriptus*	IUCN Red List; Least Conern
Eland	*Taurotragus*	*oryx*	
Reedbuck	*Redunca*	*arundinum*	IUCN Red List; Least Conern
Mountain Reedbuck	*Redunca*	*fulvorufula*	IUCN Red List; Endangered
Aardwolf	*Proteles*	*cristatus*	IUCN Red List; Least Conern
Caracal	*Felis*	*caracal*	IUCN Red List; Least Conern
African Wild Cat	*Felis*	*lybica*	
Black-Backed Jackal	*Canis*	*mesomelas*	IUCN Red List; Least Conern
Cape Clawless Otter	*Aonyx*	*capensis*	IUCN Red List; Near Threatened
Ratel	*Mellivora*	*capensis*	IUCN Red List; Least Conern
Striped Weasel/ White-Naped Weasel	*Poecilogale*	*albinucha*	IUCN Red List; Least Conern
Striped Polecat	*Ictonyx*	*striatus*	IUCN Red List; Least Conern
Large-Spotted Genet	*Genetta*	*tigrina*	IUCN Red List; Least Conern
Large Grey Mongoose	*Herpestes*	*ichneumon*	IUCN Red List; Least Conern
Small Grey Mongoose	*Galerella*	*pulverulenta*	
White -Tailed Mongoose	*Ichneumia*	*albicauda*	IUCN Red List; Least Conern
Water Mongoose	*Atilax*	*Paludinosus*	IUCN Red List; Least Conern
Vervet Monkey	*Cercopithecus*	*aethiops*	IUCN Red List; Least Conern
Aardvark (Antbear)	*Orycteropus*	*afer*	IUCN Red List; Least Conern

12. APPENDIX 2 – LIST OF PLANT SPECIES

The following table lists the plants that may potentially occur within the project area. The list was compiled using both SANBI's new POSA area search and Mucina & Rutherford's (2012) species list for the Mthatha Moist Grassland vegetation type.

Table 12.1. Plant species that may potentially be found within the development area for the proposed road upgrade and associated mining sites.

Family	Species Name	Ecology	SA Red list/IUCN
Acanthaceae	*Thunbergia dregeana*	Indigenous	SANBI Red List; Least Concern
Aizoaceae	*Delosperma clavipes*	Indigenous	SANBI Red List; Data Deficient
Amaranthaceae	*Sarcocornia natalensis var. natalensis*	Indigenous	SANBI Red List; Least Concern
	Sarcocornia decumbens	Indigenous; Endemic	SANBI Red List; Least Concern
	Salsola kali	notIndigenous; Naturalised; Invasive	NEMBA Category 1b
	Chenopodium album	notIndigenous; Naturalised; Invasive	
Amaryllidaceae	*Boophone disticha*	Indigenous	SANBI Red List; Least Concern
Apiaceae	*Daucus carota*	notIndigenous; Naturalised	IUCN Red List; Data Deficient
	Centella asiatica	Indigenous	SANBI Red List; Least Concern
Apocynaceae	*Cynanchum obtusifolium*	Indigenous	SANBI Red List; Least Concern
Araceae	*Zantedeschia albomaculata subsp. albomaculata*	Indigenous	SANBI Red List; Least Concern
Araliaceae	*Cussonia spicata*	Indigenous	SANBI Red List; Least Concern
	Cussonia sp.		
Asphodelaceae	*Kniphofia baurii*	Indigenous; Endemic	SANBI Red List; Least Concern
Asteraceae	*Chrysocoma ciliata*	Indigenous	SANBI Red List; Least Concern
	Senecio oxyodontus	Indigenous; Endemic	SANBI Red List; Least Concern
	Senecio asperulus	Indigenous	SANBI Red List; Least Concern
	Senecio coronatus	Indigenous	SANBI Red List; Least Concern
	Helichrysum rugulosum	Indigenous	SANBI Red List; Least Concern
	Senecio retrorsus	Indigenous	SANBI Red List; Least Concern
	Sonchus dregeanus	Indigenous	SANBI Red List; Least Concern
	Vernonia capensis	Indigenous	SANBI Red List; Least Concern
	Senecio pterophorus	Indigenous	SANBI Red List; Least Concern
	Felicia filifolia subsp. filifolia	Indigenous	SANBI Red List; Least Concern
Bignoniaceae	*Tecomaria capensis*	Indigenous	SANBI Red List; Least Concern
Boraginaceae	*Cynoglossum hispidum*	Indigenous	SANBI Red List; Least Concern
Burseraceae	*Commiphora harveyi*	Indigenous	SANBI Red List; Least Concern
Campanulaceae	*Wahlenbergia orae*	Indigenous; Endemic	SANBI Red List; Least Concern
	Wahlenbergia stellarioides	Indigenous; Endemic	SANBI Red List; Least Concern
Capparaceae	*Capparis sepiaria var. citrifolia*	Indigenous	SANBI Red List; Least Concern
Caryophyllaceae	*Spergularia media*	notIndigenous; Naturalised	IUCN Red List; Least Concern
Ceratophyllaceae	*Ceratophyllum demersum var. demersum*	Indigenous	SANBI Red List; Least Concern
Colchicaceae	*Wurmbea angustifolia*	Indigenous	SANBI Red List; Least Concern
Commelinaceae	*Cyanotis speciosa*	Indigenous	SANBI Red List; Least Concern

Convolvulaceae	*Convolvulus sagittatus*	Indigenous	SANBI Red List; Least Concern
	Falkia repens	Indigenous; Endemic	SANBI Red List; Least Concern
	Ipomoea crassipes	Indigenous	SANBI Red List; Least Concern
Cyperaceae	*Pycreus macranthus*	Indigenous	SANBI Red List; Least Concern
	Pycreus intactus	Indigenous	SANBI Red List; Least Concern
	Cyperus obtusiflorus var. obtusiflorus	Indigenous	SANBI Red List; Least Concern
	Abildgaardia ovata	Indigenous	SANBI Red List; Least Concern
	Cyperus haematocephalus	Indigenous	SANBI Red List; Least Concern
Dipsacaceae	*Scabiosa albanensis*	Indigenous; Endemic	SANBI Red List; Least Concern
	Scabiosa columbaria	Indigenous	SANBI Red List; Least Concern
Ebenaceae	*Euclea natalensis subsp. natalensis*	Indigenous	SANBI Red List; Least Concern
Ericaceae	*Erica caffrorum var. caffrorum*	Indigenous	SANBI Red List; Least Concern
Fabaceae	*Millettia grandis*	Indigenous; Endemic	SANBI Red List; Least Concern
	Tephrosia macropoda var. diffusa	Indigenous	SANBI Red List; Least Concern
	Indigofera stricta	Indigenous; Endemic	SANBI Red List; Least Concern
	Desmodium incanum	Not indigenous; Naturalised	
	Bauhinia bowkeri	Indigenous; Endemic	SANBI Red List; **Near Threatened**
	Philenoptera sutherlandii	Indigenous; Endemic	SANBI Red List; Least Concern
	Teramnus labialis subsp. labialis	Indigenous	SANBI Red List; Least Concern
	Senegalia caffra	Indigenous	SANBI Red List; Least Concern
	Crotalaria virgulata subsp. grantiana	Indigenous	SANBI Red List; Least Concern
	Tephrosia macropoda var. macropoda	Indigenous	SANBI Red List; Least Concern
	Rhynchosia minima var. minima	Indigenous	SANBI Red List; Least Concern
	Rhynchosia caribaea	Indigenous	SANBI Red List; Least Concern
	Alysicarpus rugosus subsp. perennirufus	Indigenous	SANBI Red List; Least Concern
	Lablab purpureus subsp. uncinatus	Indigenous	SANBI Red List; Least Concern
	Calpurnia aurea subsp. aurea	Indigenous	SANBI Red List; Least Concern
	Lessertia brachystachya	Indigenous	SANBI Red List; Least Concern
	Argyrolobium rotundifolium	Indigenous	SANBI Red List; Least Concern
	Chamaecrista mimosoides	Indigenous	SANBI Red List; Least Concern
	Eriosema salignum	Indigenous	SANBI Red List; Least Concern
	Indigofera hedyantha	Indigenous	SANBI Red List; Least Concern
	Rhynchosia totta	Indigenous	SANBI Red List; Least Concern
	Acacia natalitia	Indigenous; Endemic	SANBI Red List; Least Concern
Geraniaceae	*Pelargonium zonale*	Indigenous; Endemic	SANBI Red List; Least Concern
Goodeniaceae	*Scaevola plumieri*	Indigenous	SANBI Red List; Least Concern
Hyacinthaceae	*Ornithogalum saundersiae*	Indigenous	SANBI Red List; Least Concern
	Ledebouria ovatifolia	Indigenous	SANBI Red List; Least Concern
Icacinaceae	*Apodytes dimidiate subsp. dimidiata*	Indigenous	SANBI Red List; Least Concern
Iridaceae	*Crocosmia masoniorum*	Indigenous; Endemic	SANBI Red List; **Vulnerable**
	Freesia laxa subsp. Laxa	Indigenous	SANBI Red List; **Vulnerable**
Lamiaceae	*Pycnostachys reticulata*	Indigenous	SANBI Red List; Least Concern
	Plectranthus praetermissus	Indigenous; Endemic	SANBI Red List; **Vulnerable**

Lobeliaceae	*Lobelia anceps*	Indigenous	SANBI Red List; Least Concern
	Lobelia flaccida	Indigenous	SANBI Red List; Least Concern
Malvaceae	*Grewia occidentalis var. occidentalis*	Indigenous	SANBI Red List; Least Concern
	Dombeya tiliacea	Indigenous; Endemic	SANBI Red List; Least Concern
	Hermannia parviflora	Indigenous	SANBI Red List; Least Concern
Moraceae	*Ficus burtt-davyi*	Indigenous	SANBI Red List; Least Concern
Oleaceae	*Jasminum breviflorum*	Indigenous	SANBI Red List; Least Concern
	Olea exasperata	Indigenous; Endemic	SANBI Red List; Least Concern
	Olea capensis subsp. capensis	Indigenous; Endemic	SANBI Red List; Least Concern
Orchidaceae	*Habenaria dives*	Indigenous	SANBI Red List; Least Concern
Pittosporaceae	*Pittosporum viridiflorum*	Indigenous	SANBI Red List; Least Concern
Poaceae	*Stiburus alopecuroides*	Indigenous	SANBI Red List; Least Concern
	Avena byzantina	Not Indigenous; Naturalised; Invasive	IUCN Red List; Least Concern
	Pennisetum thunbergii	Indigenous	SANBI Red List; Least Concern
	Bromus catharticus	Not Indigenous; Naturalised; Invasive	
	Elionurus muticus	Indigenous	SANBI Red List; Least Concern
	Eragrostis curvula	Indigenous	SANBI Red List; Least Concern
	Heteropogon contortus	Indigenous	SANBI Red List; Least Concern
	Microchloa caffra	Indigenous	SANBI Red List; Least Concern
	Paspalum dilatatum	Not Indigenous; Naturalised; Invasive	
	Sporobolus africanus	Indigenous	SANBI Red List; Least Concern
	Themeda triandra	Indigenous	SANBI Red List; Least Concern
	Alloteropsis semialata subsp. eckloniana	Indigenous	SANBI Red List; Least Concern
	Aristida congesta	Indigenous	SANBI Red List; Least Concern
	Brachiaria serrata	Indigenous	SANBI Red List; Least Concern
	Chloris virgata	Indigenous	SANBI Red List; Least Concern
	Cymbopogon marginatus	Indigenous	SANBI Red List; Least Concern
	Cynodon dactylon	Indigenous	SANBI Red List; Least Concern
	Digitaria eriantha	Indigenous	SANBI Red List; Least Concern
	Eragrostis capensis	Indigenous	SANBI Red List; Least Concern
	Eustachys paspaloides	Indigenous	SANBI Red List; Least Concern
	Harpochloa falx	Indigenous	SANBI Red List; Least Concern
	Hemarthria altissima	Indigenous	SANBI Red List; Least Concern
	Hyparrhenia hirta	Indigenous	SANBI Red List; Least Concern
	Panicum ecklonii	Indigenous	SANBI Red List; Least Concern
	Paspalum scrobiculatum	Indigenous	SANBI Red List; Least Concern
	Setaria nigrirostris	Indigenous	SANBI Red List; Least Concern
	Tristachya leucothrix	Indigenous	SANBI Red List; Least Concern
Polygalaceae	*Polygala macowaniana*	Indigenous; Endemic	SANBI Red List; Least Concern
	Rumex acetosella subsp. angiocarpus	Not indigenous; Naturalised	NEMBA-Category 1a
Putranjivaceae	*Drypetes gerrardii var. gerrardii*	Indigenous	SANBI Red List; Least Concern
Rubiaceae	*Psychotria capensis subsp.capensis var. capensis*	Indigenous	SANBI Red List; Not Evaluated

	Mitriostigma axillare	Indigenous; Endemic	SANBI Red List; Least Concern
	Anthospermum littoreum	Indigenous; Endemic	SANBI Red List; Least Concern
	Pavetta revoluta	Indigenous	SANBI Red List; Least Concern
	Pentanisia prunelloides subsp. latifolia	Indigenous	SANBI Red List; Least Concern
	Coddia rudis	Indigenous	SANBI Red List; Least Concern
Santalaceae	*Viscum obscurum*	Indigenous	SANBI Red List; Least Concern
Sapotaceae	*Sideroxylon inerme subsp. inerme*	Indigenous	SANBI Red List; Least Concern
Scrophulariaceae	*Diascia esterhuyseniae*	Indigenous; Endemic	SANBI Red List; Least Concern
Solanaceae	*Capsicum sp.*		
	Lycium acutifolium	Indigenous; Endemic	SANBI Red List; Least Concern
Thymelaeaceae	*Lasiosiphon calocephalus*	Indigenous; Endemic	SANBI Red List; Least Concern
Urticaceae	*Obetia tenax*	Indigenous	SANBI Red List; Least Concern
Violaceae	*Rinorea angustifolia subsp. natalensis*	Indigenous	SANBI Red List; Least Concern
Vitaceae	*Rhoicissus revoilii*	Indigenous	SANBI Red List; Least Concern
	Rhoicissus tridentate subsp. cuneifolia	Indigenous	SANBI Red List; Least Concern