

**Proposed upgrading of the bridge on the N2
over the Gwaing River,
George, Western Cape Province**

Vegetation Impact Assessment Report

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ABSTRACT

The proposed upgrading of the bridge over the Gwaing River near George triggers a number of listed activities as included in the Environmental Impact Assessment Regulations (08 December 2014), GN R 982 – 985, in accordance with the National Environmental Management Act, No. 107 of 1998 (NEMA), as amended. The appointed Environmental Assessment Practitioner, KSEMS Environmental Consulting (Pty) Ltd, commissioned EnviroNiche Consulting, to undertake a floristic impact assessment to determine the impacts which may be triggered by the proposed development. The requirements of this assessment were to undertake a specialist study to assess the floristic biodiversity and ecology of this proposed development as well as to determine the significance of the impacts this proposed widening of the bridge will have within the identified project site.

The project site is a 30m wide corridor situated on both sides of the Gwaing River. Three alternative options were investigated. Alternative 1 (preferred option) is to widen the existing bridge on the northern side (upstream of the existing bridge). Alternative 2 is to widen the bridge a few metres on both sides. Alternative 3 is to widen the bridge on the southern side of the existing bridge.

The ancient coastal terrace between the Outeniqua Mountains and the present coastline has been eroded over millions of years to form an extensive undulating coastal plain dissected by numerous streams. This created a landscape of roundish crests, gentle slopes and relatively deep valleys. Almost all the vegetation types on this coastal plain around George are listed as Critical Biodiversity Areas (CBAs) and threatened ecosystems. Agricultural activities (crop, planted pasture production), forestry (pine & bluegum plantations) as well as alien invasive plants have destroyed almost the entire region's natural vegetation. A few isolated pockets of natural vegetation remain in those areas unsuitable for crop production.

The Gwaing bridge is situated in the Garden Route Granite Fynbos (Status: Critically Endangered) vegetation type on the crests and plains. The Gwaing River valley is dominated by the Cape Lowland Alluvial Vegetation (Status: Critically Endangered). This particular vegetation type is dominated by shrubs and trees which occur along the steep slopes and in deep sheltered valleys. Pockets of Southern Afromontane Forest (Least Threatened) also occur along the slopes of the Gwaing River. The Gwaing River is also classified as a NFEPA-listed perennial streams.

The entire landscape around the Gwaing Bridge and along the N2 has been transformed. Almost all areas, with arable soil, have been ploughed and subsequently the natural vegetation has been destroyed. The riparian vegetation along the Gwaing River has been invaded by alien tree and shrub species. Very few of the original vegetation remains. According to the Plants of South Africa

species list (POSA) the total number of Red Data plant species present in the quarter degree square in which the project site falls is 74.

From an ecological perspective Alternative 1 is the preferred option. Alternatives 2 and 3 would have negative impacts on an unnamed, seasonal stream which drains the area on the southern side of the N2 and the Gwaing Bridge.

RECOMMENDATIONS

The following is recommended:

General

- An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly;
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to;
- The areas to be cleared as well as the construction area should be clearly demarcated;
- All construction vehicles should adhere to clearly defined and demarcated roads and parking areas;
- Dust suppression and erosion management should be an integrated component of the construction approach;
- No dumping of building waste or spoil material from the development should take place on areas other than a nearby licenced landfill site;
- All hazardous materials should be stored appropriately to prevent contamination of the project site. Any accidental chemical, fuel and oil spills that occur at the project site should be cleaned up appropriately as related to the nature of the spill;

Flora

- Bush clearing must be kept to the minimum. This is to protect the rare shrubs and other plants
- There should be a preconstruction walk-through of the development footprint/project site in order to assess the area for Red Data and protected species especially bulbous and succulent species which could be transplanted.
- Weed control measures must be applied to eradicate the noxious weeds (category 1a & 1b species) on disturbed areas.

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1. APPOINTMENT OF SPECIALIST

EnviroNiche Consulting was appointed by **KSEMS Environmental Consulting (Pty) Ltd** to conduct an impact assessment on the project site's vegetation as part of the EIA process to obtain environmental authorisation for the upgrading of the N2 bridge over the Gwaing River.

1.1 Details of specialist

P.J du Preez (Ph.D., Pr.Sci.Nat.)

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1.2 Summary of expertise

- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science), registration number: 400271/07.
- Ecological consultant since 2000.
- Conducted, or co-conducted, over 1 500 specialist ecological surveys as an ecological consultant.
- Co-author of a book on African ecology
- Published over 30 refereed scientific reports,
- Presented 26 scientific conference presentations.

2. DECLARATION OF INDEPENDENCE

I, Pieter Johannes du Preez, ID 6008215016087, declare that I:

- am the co-owner of Lefatse Environmental Planning Services (Pty) Ltd
- act as an independent specialist consultant in the field of botany, ecology and vegetation science;
- am assigned as the ecology specialist consultant by **KSEMS Environmental Consulting (Pty) Ltd** for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making authorities responsible for permitting this proposal and
- the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project.
- I have no and will not engage in conflicting interests in the undertaking of the activity;

- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2014;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.

A handwritten signature in red ink, appearing to read 'PJ DU PREEZ', is positioned below the list of bullet points.

PJ DU PREEZ PhD PrSciNat

3. INTRODUCTION

3.1 Terms of reference

The terms of reference were to undertake an impact assessment to describe the potential impacts on the vegetation and the assessment must include:

- » a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project
- » a description and evaluation of environmental issues and potential impacts (including direct, indirect, cumulative impacts and residual risks) that have been identified
- » Direct, indirect, cumulative impacts and residual risks of the identified issues must be evaluated within the EIA Report in terms of the following criteria:
 - * the nature, which shall include a description of what causes the effect, what will be affected and how it will be affected;
- » a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- » a comparative evaluation of the identified feasible alternatives, and nomination of a preferred alternative
- » Any aspects which are conditional to the findings of the assessment which are to be included as conditions of the Environmental Authorisation
- » This must also include any gaps in knowledge at this point of the study. Consideration of areas that would constitute “acceptable and defensible loss” should be included in this discussion.
- » A reasoned opinion as to whether the proposed project should be authorised.
- » Summary of the positive and negative impacts and risks of the proposed project and identified alternatives.
- » Mitigation measures and management recommendations to be included in the Environmental Management Programme to be submitted with the FEIR

4. ASSUMPTIONS AND LIMITATIONS

4.1 Assumptions

- The biodiversity at the project site will be destroyed at the project site.

4.2 Limitations

- Limitation of historic data and available databases
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys).
- Due to the brief duration of the survey, the species list provided for the project site cannot be regarded as comprehensive, but is nevertheless likely to include the majority of the dominant and common species present.

5. ACTS & LEGISLATION

Acts such as those listed below (Table 5.1); ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities.

Table 5.1: List of relevant legislation

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act, No. 107 of 1998 (NEMA), as amended & NEMA EIA Regulations, 2014: GN544, published in Government Gazette 33306 in 2014	A full Environmental Impact Assessment Report (EIA) is required for this project	Department of Environmental Affairs (DEA)	1998
National Environmental Management: Biodiversity Act (10/2004): Amendments, 2014	Protected species may occur on site	Department of Environment Affairs and Development Planning (EAPD)	2014
National Water Act, No. 36 of 1998	The proposed development may trigger a section 21(C and/or i) water use.	Department of Water Affairs and Sanitation (DWS)	1998
National Heritage Resources Act (Act No 25 of 1999)	Resources could be identified during construction phase	South African Heritage Resources Agency	1999
Western Cape Nature Conservation Ordinance (No 19 of 1974) and its amendments	Protected species could occur on the proposed sites	Cape Nature & Department of Environment Affairs and Development Planning (EAPD)	2009
National Forests Act (Act 84 of 1998)	Protected trees could occur on the proposed sites	Department of Agriculture, Forestry and Fisheries (DAFF)	1998

6. DESCRIPTION OF STUDY AREA

6.1 Description of the broader study area and project site

6.1.1 Location (Figure 6.1 – 6.4)

The project site is a $\pm 30\text{m}$ wide corridor which starts $\pm 780\text{m}$ west of the bridge and ends $\pm 1450\text{m}$ east of the bridge. The project site is situated in 3422AB quarter degree square. The study area falls within the **Fynbos Biome** and classified as belonging to the Garden Route Granite Fynbos vegetation type on the crests and plains and the Cape Lowland Alluvial Vegetation in the river valleys. (Mucina & Rutherford 2006)

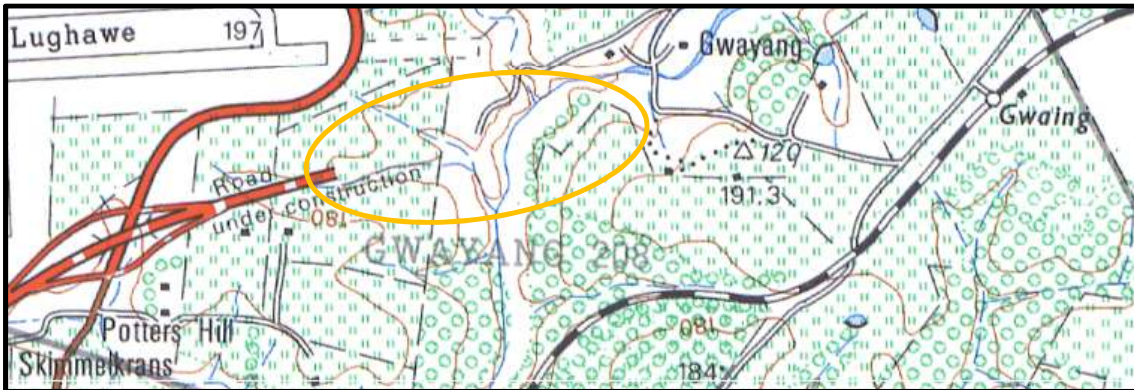


Figure 6.1: A topographic map of the Gwaing bridge site. The bridge was constructed after the publication of the topographical map in 1982.



Figure 6.2: A Google Earth photo of the Gwaing bridge site (arrow)(Google Earth 2016).

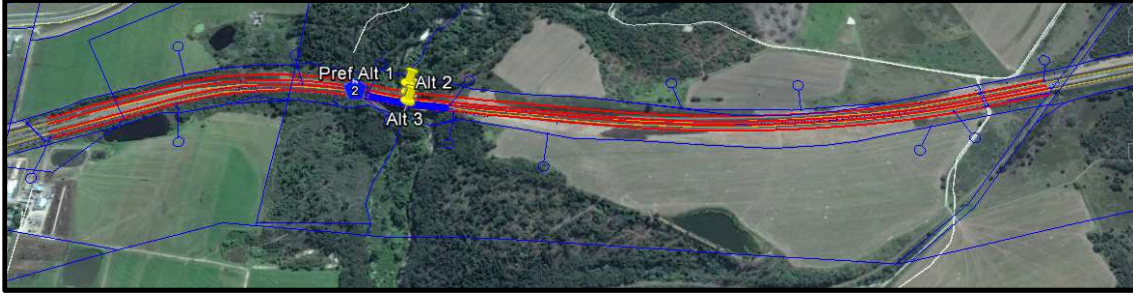


Figure 6.3: A Google Earth photo of the Gwaing bridge site. The red lines indicate the proposed bridge alternatives (Google Earth 2016)



Figure 6.4: A close-up Google Earth photo of the Gwaing bridge site. The red lines indicate the proposed bridge alternatives (Google Earth 2016)

6.1.2

Topography, geology & soils

The project site is a linear project and it cuts across a drainage line (Gwaing River) which has eroded the ancient coastal plain between the Outeniqua Mountain range and the ocean. The altitude varies between 147 m.a.s.l. at the bridge and 188 m.a.s.l. at the eastern end of the construction site. The dominant geology is shale deposits of the Bokkeveld and Uitenhage Groups as well as a number of granite intrusions. The soils are clays and loams of the Glenrosa and Mispah soil forms (Mucina & Rutherford 2006).

6.1.2 Climate (Rainfall & temperatures)

The project area receives rain throughout the year and varies from 270 – 620mm per year The mean annual temperature is 17,0°C (Mucina & Rutherford, 2006).

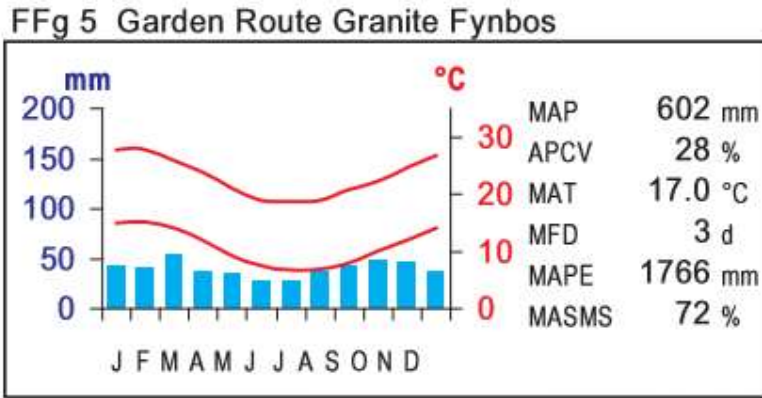


Figure 6.5: A climate-diagram of the Garden Route Granite Fynbos (Mucina & Rutherford, 2006).

6.1.5 Land use & land cover

The main land use in the study area is agriculture with cattle farming as the main sources of revenue. Almost all arable soils were ploughed and it is used for crop and planted pasture production. These crop fields, plantations and roads cause dis-connectivity of the landscape.

6.1.6 Vegetation, biogeography and conservation value

The most recent description of the broader study area's vegetation is the general description by Mucina & Rutherford (2006) relating to the vegetation which is considered to be the "Vegetation of South Africa, Lesotho and Swaziland" as well as its accompanying map of the country by (Mucina *et al.*, 2005). This memoir contains species information and a comprehensive conservation assessment of all vegetation types.

The two main vegetation types present at or near the project site are the Garden Route Granite Fynbos (FFg 5) and the Cape Lowland Alluvial Vegetation (AZa 2)(Mucina & Rutherford 2006).

Table 6.1: Vegetation types near the project site (Mucina & Rutherford 2006).

Alternative Route 1, 2 & 3			
No	Name	Code	Status
1	Cape Lowland Alluvial vegetation	AZa2	Critically Endangered
2	Garden Route Granite Fynbos	FFg5	Critically Endangered
3	Southern Afrotemperate Forest	FOz1	Least threatened

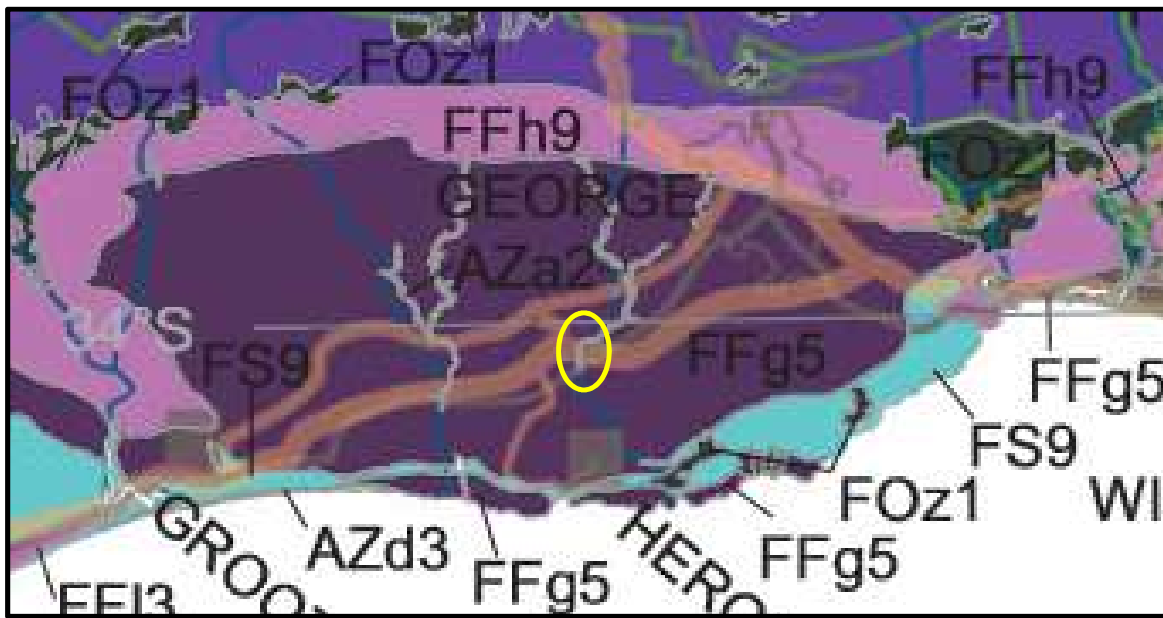


Figure 6.6: A vegetation map of the project site (yellow polygon) and the surrounding areas which is dominated by the Garden Route Granite Fynbos (FFg 5) (Mucina & Rutherford, 2006).

7. METHODOLOGY

7.1 Vegetation survey

Date of fieldwork: The site visit was done on 14 September 2016.

Satellite imagery (Google Earth photos) and 1:50 000 topographic maps were used to find features within the project site.

Quantitative data was collected in each quadrat by undertaking vegetation sampling according to the Braun-Blanquet approach (Mueller-Dombois & Ellenberg 1974; Westhoff & van der Maarel 1978). In each sample site the following data was collected:

Habitat data:

- amount of bare soil;
- rock cover;
- slope;
- aspect in degrees;
- latitude and longitude position (from GPS) in decimal degrees;
- presence of biotic disturbances, e.g. grazing, animal burrows, etc.

Vegetation data

- species present;
- cover estimation of each species according to the Braun-Blanquet scale;
- vegetation height.

Data analysis

- The plant communities that were identified were described using the vegetation sample data.
- Additional checklists of plant species were compiled by traversing the project site on foot and recording species as they were encountered. Plant names follow those of POSA (2015).
- All exotic species categorised as alien invaders or weeds as listed in the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014* were also recorded.

Due to the brief duration of the survey, the species list provided for the project site cannot be regarded as comprehensive, but is nevertheless likely to include the majority of the dominant and common species present.

7.1.2 Red Data plant species

A list of species collected within the quarter degree square **3422AB** are listed together with the species noted during the site visit (Annexures B & C). For all threatened plants that occur in the general geographical area of the project site, a rating of the likelihood of it occurring within the project site is given as follows:

- **LOW:** no suitable habitats occur on site / habitats on site do not match habitat description for species;
- **MEDIUM:** habitats on site match the general habitat description for species (e.g. grassland), but detailed microhabitat requirements (e.g. rocky grassland on shallow soils overlying dolomite or dolerite) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;

- HIGH: habitats found on site match very strongly the general and microhabitat description for the species (e.g. rocky grassland on shallow soils overlying granite);
- DEFINITE: species found on site.

7.2 Impact Rating Methodology

Direct, indirect and cumulative impacts of the issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
 - * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
 - * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * medium-term (5–15 years) – assigned a score of 3
 - * long term (> 15 years) - assigned a score of 4; or
 - * permanent - assigned a score of 5;
- The **consequences (magnitude)**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- The **status**, which will be described as either positive, negative or neutral.
- The **degree** to which the impact can be **reversed**.
- The **degree** to which the impact may cause **irreplaceable loss of resources**.
- The **degree** to which the impact can be **mitigated**.

The significance is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

8. RESULTS

8.1 Vegetation overview

8.1.1 Broad vegetation types

The landscape is an extensive undulating coastal plain situated between the Outeniqua Mountains and the coastline. Numerous streams dissected this plain creating roundish crests, gentle slopes and relatively deep river valleys. The typical and dominant vegetation type of the study area is the Garden Route Granite Fynbos (FFg 5) as described by Mucina & Rutherford (2006). The vegetation consists mostly of fynbos shrubs such as *Passerina corymbosa*, *Cliffortia serpyllifolia*, *Cliffortia falcata*, *Protea coronata*, *Protea lanceolata*, *Protea neriifolia*, *Erica discolor*, *Erica peltata*, *Phylica confusa*, *Syncarpha paniculata*, *Agathosma ovata*, *Anthospermum prostaratum*, *Aspalathus asparagoides* and *Leucadendron salignum* to name a few (Mucina & Rutherford 2006).

The Cape Lowland Alluvial Vegetation (AZa 2) occurs along the banks of some of the rivers which drain towards the ocean. Typical species present are *Virgillia divaricata*, *Salix mucronata*, *Buddleja saligna*, *Cliffortia strobilifera*, *Freylinia lanceolata*, *Searsia angustifolia*, *Prionium serratum*, *Melianthus major* and *Calopis paniculata* (Mucina & Rutherford 2006).

A species list from POSA (<http://posa.sanbi.org>, Grid reference **3422AB**) of the George area was obtained. POSA generated species lists also contain updated Red Data species status according to the Red List of South African Plants published by SANBI in *Strelitzia* 25 (Raimondo *et al.* 2009, updated 2013). Only protected and red data species that may potentially occur in the study area

and project site have been listed under results. The actual field survey confirmed which of the species, recorded by the POSA list, (Annexure C) actually occur in the study area. In addition some species not listed by POSA are listed in Annexure B.

A total of **53** species have been recorded to occur on the project site and alternative sites while **112** species have been recorded for the degree square (**3422AB**)(POSA) in which the project site is located.

a) Conservation status of broad vegetation types

The vegetation types of South Africa have been classified according to their conservation status which is, in turn, assessed according to the degree of transformation and rates of conservation. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. On a national scale these thresholds are as depicted in the table below, as determined by best available scientific approaches (Driver *et al.* 2005). The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36% (Driver *et al.* 2005).

Table 8.1: Determining ecosystem status (from Driver *et al.* 2005). *BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)	80-100	least threatened	LT
	60-80	vulnerable	VU
	*BT-60	endangered	EN
	0-*BT	critically endangered	CR

The National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environment Management: Biodiversity Act (Act No. 10 of 2004), lists national vegetation types that are afforded protection on the basis of rates of transformation. The threshold for listing in this legislation is higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature.

According to Mucina and Rutherford (2006), the vegetation units which will impacted by the proposed construction activities are the Garden Route Granite Fynbos (Critically Endangered), Cape Lowland Alluvial Vegetation (Critically Endangered) and Southern Cape Afromontane Forests (Least Threatened). All three vegetation types are hardly protected (1%)(Table 8.1). The Garden Route Granite Fynbos vegetation unit is listed as a threatened ecosystem in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM: BA).

Table 8.2: Conservation status of the vegetation type occurring in and around the study area.

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation Status	
				Driver et al., 2005; Mucina & Rutherford, 2006	National Ecosystem List (NEM:BA)
Garden Route Granite Fynbos	23%	1%	70%	Critically endangered	Listed under NEM:BA
Cape Lowland Alluvial Vegetation	31%	1%	72%	Critically endangered	Listed under NFEPA
Southern Cape Afro-temperate Forests	34%	>50%	>300ha	Least Threatened	Not Listed

b) Red List and protected plant species of the study area

As previously mentioned, a species list was obtained from POSA for the relevant degree grids. The species on this list were evaluated to determine the likelihood of any of them occurring in the study area and the project site. Of the species that are considered to occur within the geographical area under consideration, there are **74** species which can be regarded as conservation worthy. **11** species recorded in the degree grid are listed on the Red List plant species (Red flagged species in Annexure C). The remaining **63** species are protected in terms of the Western Cape Nature Conservation Ordinance (No19 of 1974) (Table 8.3).

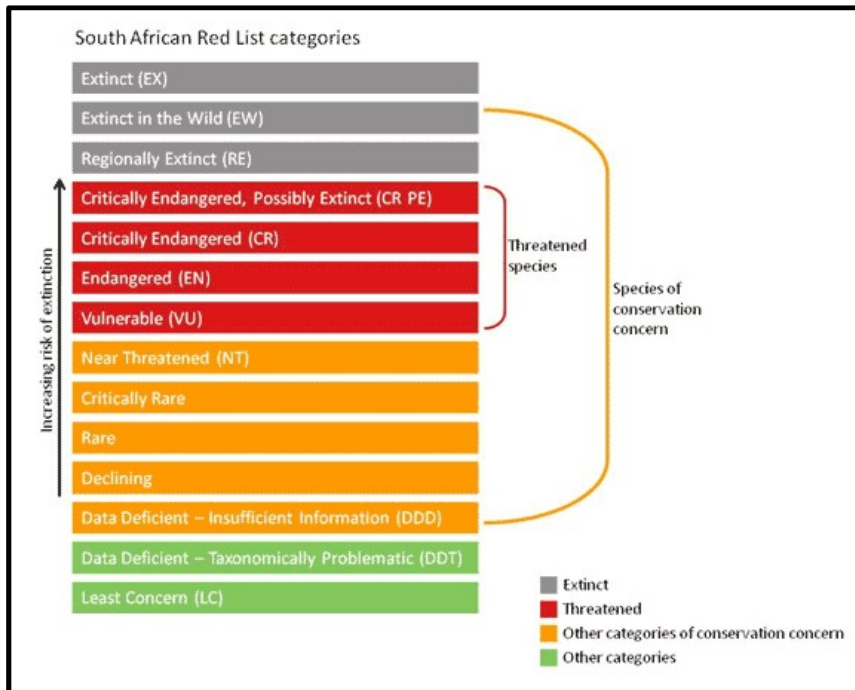


Figure 8.1: Schematic representation of the South African Red List categories. Taken from <http://redlist.sanbi.org/redcat.php>

Table 8.3: Species listed as conservation worthy within the 2528CB degree square South African Red List (SARL), National Forest Act (NFA), Western Cape Nature Conservation Ordination (WCNCO).

Family	Species	Threat status
APOCYNACEAE	<i>Tylophora cordata</i> (Thunb.) Druce	LC
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	Declining
CRASSULACEAE	<i>Crassula decumbens</i> Thunb. var. <i>brachyphylla</i> (Adamson) Toelken	NT
ERICACEAE	<i>Erica axillaris</i> Thunb.	LC
ERICACEAE	<i>Erica canaliculata</i> Andrews	LC
ERICACEAE	<i>Erica cerinthoides</i> L. var. <i>cerinthoides</i>	LC
ERICACEAE	<i>Erica curviflora</i> L.	LC
ERICACEAE	<i>Erica ericoides</i> (L.) E.G.H.Oliv.	LC
ERICACEAE	<i>Erica formosa</i> Thunb.	LC
ERICACEAE	<i>Erica glandulosa</i> Thunb. subsp. <i>fourcadei</i>	VU
ERICACEAE	<i>Erica glandulosa</i> Thunb. subsp. <i>glandulosa</i>	LC
ERICACEAE	<i>Erica hispidula</i> L. var. <i>hispidula</i>	LC
ERICACEAE	<i>Erica imbricata</i> L.	LC
ERICACEAE	<i>Erica opulenta</i> (J.C.Wendl. ex Klotzsch) Benth.	LC
ERICACEAE	<i>Erica peltata</i> Andrews	LC
ERICACEAE	<i>Erica quadrangularis</i> Salisb.	LC
ERICACEAE	<i>Erica scabriuscula</i> Lodd.	LC
ERICACEAE	<i>Erica sessiliflora</i> L.f.	LC
ERICACEAE	<i>Erica triceps</i> Link	LC
ERICACEAE	<i>Erica uberiflora</i> E.G.H.Oliv.	
	<i>Euphorbia barnardii</i> A.C.White, R.A.Dyer & B.Sloane	EN
HYACINTHACEAE	<i>Lachenalia bulbifera</i> (Cirillo) Engl.	LC
IRIDACEAE	<i>Babiana fourcadei</i> G.J.Lewis	LC
IRIDACEAE	<i>Babiana patersoniae</i> L.Bolus	LC
IRIDACEAE	<i>Bobartia aphylla</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Bobartia robusta</i> Baker	LC
IRIDACEAE	<i>Chasmanthe aethiopica</i> (L.) N.E.Br.	LC
IRIDACEAE	<i>Gladiolus carneus</i> D.Delaroche	LC
IRIDACEAE	<i>Gladiolus cunonius</i> (L.) Gaertn.	LC
IRIDACEAE	<i>Gladiolus grandiflorus</i> Andrews	LC
IRIDACEAE	<i>Gladiolus gueinzii</i> Kunze	LC
IRIDACEAE	<i>Gladiolus liliaceus</i> Houtt.	LC
IRIDACEAE	<i>Hesperantha falcata</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Ixia orientalis</i> L.Bolus	LC
IRIDACEAE	<i>Lapeirousia anceps</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Melasphaerula ramosa</i> (L.) N.E.Br.	LC
IRIDACEAE	<i>Micranthus alopecuroides</i> (L.) Rothm.	LC
IRIDACEAE	<i>Moraea reticulata</i> Goldblatt	LC
IRIDACEAE	<i>Tritoniopsis antholyza</i> (Poir.) Goldblatt	LC
IRIDACEAE	<i>Tritoniopsis caffra</i> (Ker Gawl. ex Baker) Goldblatt	LC
IRIDACEAE	<i>Watsonia laccata</i> (Jacq.) Ker Gawl.	LC

MESEMBRYANTHEMACEAE	<i>Aptenia lancifolia</i> L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Carpobrotus deliciosus</i> (L.Bolus) L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Carpobrotus edulis</i> (L.) L.Bolus subsp. <i>edulis</i>	LC
MESEMBRYANTHEMACEAE	<i>Cephalophyllum diversiphyllum</i> (Haw.) H.E.K.Hartmann	NT
MESEMBRYANTHEMACEAE	<i>Delosperma multiflorum</i> L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Drosanthemum brevifolium</i> (Aiton) Schwantes	LC
MESEMBRYANTHEMACEAE	<i>Lampranthus conspicuus</i> (Haw.) N.E.Br.	DDT
MESEMBRYANTHEMACEAE	<i>Lampranthus dependens</i> (L.Bolus) L.Bolus	DDT
MESEMBRYANTHEMACEAE	<i>Lampranthus sociorum</i> (L.Bolus) N.E.Br.	VU
MESEMBRYANTHEMACEAE	<i>Lampranthus stayneri</i> (L.Bolus) N.E.Br.	LC
MESEMBRYANTHEMACEAE	<i>Lampranthus stipulaceus</i> (L.) N.E.Br.	LC
MESEMBRYANTHEMACEAE	<i>Mesembryanthemum aitonis</i> Jacq.	LC
ORCHIDACEAE	<i>Ceratandra grandiflora</i> Lindl.	LC
ORCHIDACEAE	<i>Disa hians</i> (L.f.) Spreng.	LC
ORCHIDACEAE	<i>Disa sagittalis</i> (L.f.) Sw.	LC
ORCHIDACEAE	<i>Disperis capensis</i> (L.f.) Sw. var. <i>capensis</i>	LC
ORCHIDACEAE	<i>Holothrix burchellii</i> (Lindl.) Rchb.f.	LC
ORCHIDACEAE	<i>Holothrix parviflora</i> (Lindl.) Rchb.f.	LC
ORCHIDACEAE	<i>Satyrium outeniquense</i> Schltr.	LC
ORCHIDACEAE	<i>Satyrium rupestre</i> Schltr. ex Bolus	LC
ORCHIDACEAE	<i>Satyrium stenopetalum</i> Lindl. subsp. <i>stenopetalum</i>	LC
PROTEACEAE	<i>Leucadendron salignum</i> P.J.Bergius	LC
PROTEACEAE	<i>Leucospermum formosum</i> (Andrews) Sweet	EN
PROTEACEAE	<i>Protea mundii</i> Klotzsch	LC
PROTEACEAE	<i>Protea neriifolia</i> R.Br.	LC
PROTEACEAE	<i>Protea speciosa</i> (L.) L.	LC
RUTACEAE	<i>Agathosma apiculata</i> G.Mey.	LC
RUTACEAE	<i>Agathosma capensis</i> (L.) Dummer	LC
RUTACEAE	<i>Agathosma elegans</i> Cham.	LC
RUTACEAE	<i>Agathosma ovata</i> (Thunb.) Pillans	LC
RUTACEAE	<i>Euchaetis burchellii</i> Dummer	LC
SANTALACEAE	<i>Thesium lisae-mariae</i> Stauffer	DDT
SANTALACEAE	<i>Thesium sertulariastrum</i> A.W.Hill	DDT

8.1.2 Fine- scale vegetation description

It was found that the vegetation of the project site is typical of the Garden Route Granite Fynbos and Southern Cape Afro-temperate Forests as described by Mucina & Rutherford (2006). The vegetation at the project site is not in a well-preserved condition. This can be ascribed to the fact that the area has been subjected to numerous disturbances such as the construction of the existing Gwaing Bridge and N2 road, farming activities, trampling by people and cattle, frequent fires as well as alien invasive species.

a) Natural vegetation

All three sites (preferred & alternatives) are situated in the same plant community. Annexure B list the species noted in this plant community. The vegetation can be described as a degraded fynbos community which grows on the embankments of the northern side of the N2. The

vegetation on the southern side grows on a steep slope which consists of filled material to level the road. This slope drain directly into a seasonal stream which eventually drains into the Gwaing River. From an ecological perspective the project site is suitable for a development without minimum detrimental environmental effects.

Red List and protected plant species noted during the survey in this community:

Eleven protected species were noted on the project site (Annexure B).

b) Wetland communities

Streams on the southern slopes of the Outeniqua Mountains drain towards the ocean. The coastal plain has been eroded and numerous tributaries drain the landscape. Wetlands such as small pans occur on the flat plateau areas while hill-slope seeps form wetlands along slopes. There are also numerous man-made dams and ponds which retain water to be used agricultural purposes.

The banks of the Gwaing River is mainly covered by alien invasive species such as *Eucalyptus grandicalyx*, *Acacia mearnsii*, *Sesbania punicea* and *Solanum mauritianum*. A small seasonal stream drains the southern side of the N2 as well as the Gwaing Bridge. There is also a man-made dam in this stream.

c) Alien Invasive Plants (AIPs) confirmed during the survey

The largest concentration of alien plant species is in the valleys of the streams and rivers as well as on the verges of crop fields and around small holdings and farmsteads. Woody species such as *Acacia cyclops*, *Acacia mearnsii*, *Acacia longifolia*, *Sesbania punicea*, *Pinus* spp., *Eucalyptus* spp. and weeds such as *Sonchus oleraceus*, *Solanum pseudo-capsicum*, *Solanum mauritianum*, *Pennisetum clandestinum* and other were noted.

9. CRITICAL BIODIVERSITY AREAS AND BROAD-SCALE ECOLOGICAL PROCESSES

9.1 Definitions and descriptions of Critical Biodiversity Areas

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision making tools. The use of CBAs follows the definition laid out in the guideline for publishing bioregional plans (Pence, 2017).

The identification and mapping of CBAs forms part of the biodiversity assessments of the various provinces which will be used to inform the development of the Provincial Biodiversity Sector plans, bioregional plans, and also be used to inform Spatial Development Frameworks (SDFs),

Environmental Management Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and in the Environmental Impact Assessment (EIA) process in a province.

Simply put, the purpose of the CBA is to indicate spatially the location of critical or important areas for biodiversity in the landscape. The CBA, through the underlying land management objectives that define the CBA, prescribes the desired ecological state in which the province would like to keep this biodiversity. Therefore, the desired ecological state or land management objective determines which land-use activities are compatible with each CBA category based on the perceived impact of each activity on biodiversity pattern and process.

According to the guidelines for bioregional plans, three basic CBA categories can be identified based on three high-level and management objectives (Table 9.1).

Table 9.1: Definitions and framework for linking CBAs to land-use planning and decision-making guidelines based on a set of high-level land biodiversity management objectives (Pence 2017).

CBA category	Land Management Objective
	<p>Critical Biodiversity Areas (CBAs) Definition: CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.</p>
<p>Protected Areas (PA) & CBA 1</p>	<p>Natural landscapes: Ecosystems and species are <u>fully intact</u> and <u>undisturbed</u>. These are areas with <u>high irreplaceability</u> or <u>low flexibility</u> in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met. These are landscapes that are <u>at or past</u> their limits of acceptable change.</p>
<p>CBA 2</p>	<p>Near-natural landscapes: Ecosystems and species are <u>largely intact</u> and <u>undisturbed</u>. Areas with <u>intermediate irreplaceability</u> or <u>some flexibility</u> in terms of the area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve targets. These are landscapes that are <u>approaching but have not passed</u> their limits of acceptable change.</p>
	<p>Ecological Support Areas (ESAs) Definition: ESAs are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and / or in delivering ecosystem services that support socio-economic development, such as water provision, food mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.</p>
<p>ESA</p>	<p>Functional landscapes: Ecosystem is <u>moderately to significantly disturb</u> but still able to <u>maintain basic functionality</u>.</p>

	Individual species or other biodiversity indicators may be <u>severely disturbed or reduced</u> . These are areas with a <u>low irreplaceability</u> with respect to biodiversity pattern targets only.
ONA (Other Natural Areas) and Transformed	Production landscapes: Manage land to optimisze sustainable utilisation of natural resources.

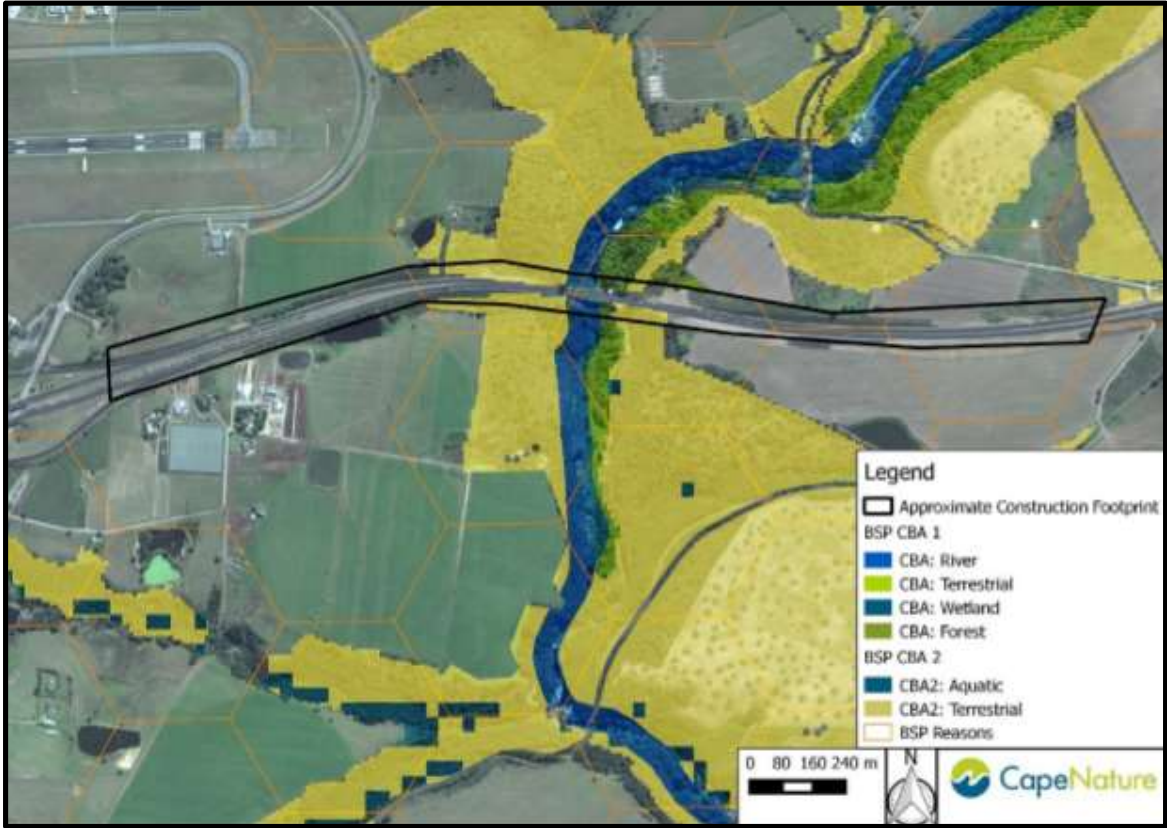


Figure 9.1: A map showing the project site (black polygon) in relation to the Critical Biodiversity areas (legend).

10. ECOLOGICAL SENSITIVITY ANALYSIS (Figure 10.1)

The sensitivity assessment identifies those parts of the project site that will have a medium to high conservation value or that will be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to have a low sensitivity. The habitat sensitivity assessment was done according to the rules provided in the “Sensitivity mapping rules for biodiversity assessments”. There are features within the project site or just

outside of the project site that may be considered to have a medium conservation value, as follows:

10.1 Streams (perennial & seasonal)

The Gwaing River is a NFEPA listed system. A number of seasonal streams drains into the Gwaing River (Fig 10.1) of the one on the southern side of the N2 and Gwaing Bridge is situated in close proximity of the N2 embankment.

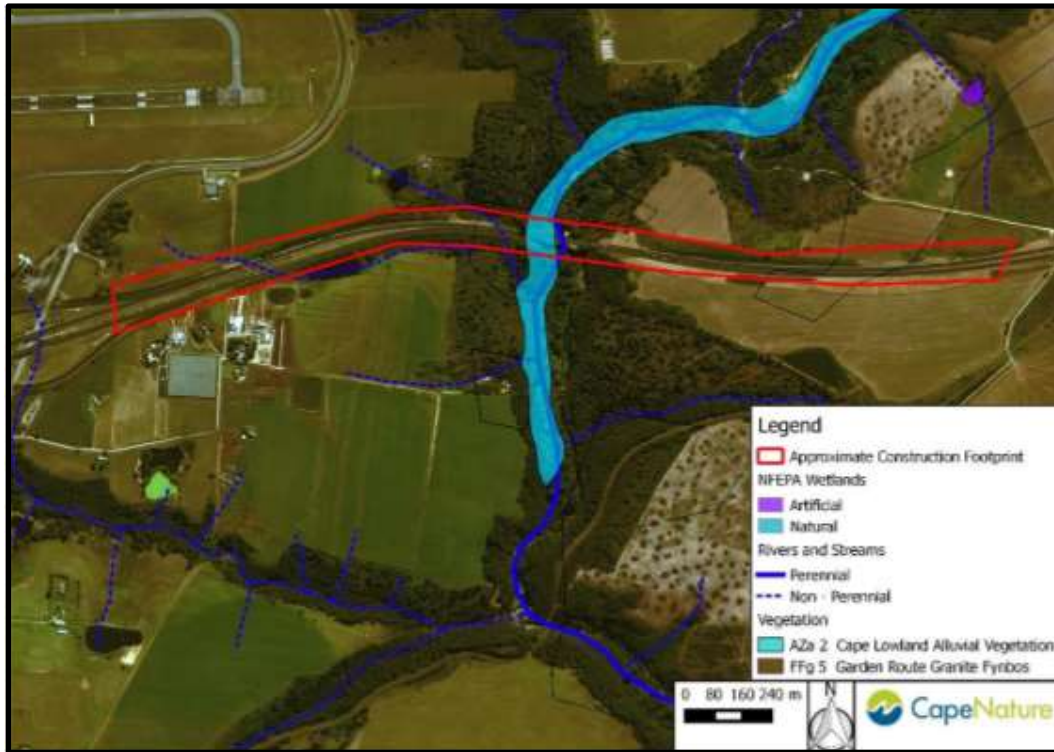


Figure 10.1: The project site (red polygon) in relation to the nearby streams.

10.2 Sensitive vegetation:

The plant communities in the, Fynbos, Renosterbos and Forest vegetation types in the southern Cape can all be regarded as sensitive. Although most of the vegetation has been destroyed by agriculture. There are remnants of fynbos where the species composition is still unique and a number of rare and endangered bulbous species and succulents and shrubs occur.

Figure 10.2 indicates the sensitive plant communities.



Figure 10.2: The ecosystem threat status of the project site (black polygon) and surrounding areas

- **Potential impacts:**
 - a) Removal of plants for firewood
 - b) Alien species may grow on disturbed areas
 - c) The vegetation will be destroyed at the footprints of the newly constructed bridge as well as the approach lanes as well as the nearby areas (construction site).
- **Mitigation measures:**
 - a) A search and rescue exercise must take place before construction commences. This is to transplant bulbous and succulent plants present in the construction area.
 - b) The construction site must be clearly demarcated to protect the vegetation from accidental destruction.
 - c) All construction vehicles should adhere to clearly defined and demarcated roads
 - d) Care must be taken not to drive through the veld unnecessary
 - e) Bush clearing must be kept to the minimum. This is to protect the rare shrubs and other plants
 - f) Weed control measures must be applied to eradicate the noxious weeds (category 1a & 1b species) on disturbed areas;
 - g) Workers must be informed that the surrounding sensitive shrub community is a no-go area

10.3 Threatened and protected plant species:

There could be a number of protected and Red Data species present in the project areas as well as the surrounding area. There are **74 Red Data** and protected species noted in the 3422AB quarter degree square. The project site is in a degraded and transformed condition and only a few species were noted.

- **Potential impacts:**

- a) This proposed upgrading of the bridge will have a negative impact on these species because of their destruction during the construction phase.

- **Mitigation measures:**

- a) A search and rescue exercise must take place before construction commences. This is to transplant bulbous and succulent plants present in the construction area.
- b) The construction site must be clearly demarcated to protect the vegetation from accidental destruction.

11. SITE IDENTIFICATION & NATURE OF IMPACTS

11.1 Overview of the most significant effects of the proposed development

a) Impacts on vegetation and protected plant species

The most likely and significant impact will be on the vegetation especially at the project site and access roads. The proposed development will lead to a direct loss of vegetation in these areas. Consequences of the impact occurring may include:

- general loss of habitat for sensitive species (plants & animals);
- loss in variation within the medium sensitive habitat due to loss of portions of it;
- general reduction in biodiversity;
- increased fragmentation (depending on the location of the impact);
- disturbance to processes maintaining biodiversity and ecosystem goods and services;

b) Soil erosion and associated degradation of ecosystems

Soil erosion is a common risk, associated with developments where vegetation clearing and disturbance is taking place. Steep slopes, service roads, compacted areas and structures will generate an increase in runoff during intense rainfall events and may potentially exaggerate the effects of erosion. Stormwater may erode new gullies down slopes.

With effective mitigation measures in place, including regular monitoring, the occurrence, spread and potential effects of erosion may be limited to an absolute minimum.

c) Alien Plant Invasions

Major factors contributing to an invasion by alien invader plants includes habitat disturbance and associated destruction of indigenous vegetation. Consequences of this may include:

- further loss and displacement of indigenous vegetation;
- change in vegetation structure leading to change in various habitat characteristics;
- change in plant species composition;
- change in soil chemistry properties;
- loss of sensitive habitats;
- loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
- fragmentation of sensitive habitats;
- change in flammability of vegetation, depending on alien species;
- hydrological impacts due to increased transpiration and runoff;

The largest concentration of alien plant species is in disturbed areas. Consequences of this may include:

- further loss and displacement of indigenous vegetation due to invasion by alien invasives.

Although the potential severity of this impact may be high, it can be easily mitigated through regular alien control.

d) Impacts on Critical Biodiversity Areas and Broad-Scale Ecological Processes

From a vegetation perspective this site's vegetation is not in a pristine condition due to disturbances such previous N2 road construction activities, agricultural activities, alien plant encroachment, etc. The project site is situated in a Critical Biodiversity Area but its small in size and the fact that it is in a relatively disturbed area will not have a significantly negative impact in relation to the larger scale

11.2 Potential cumulative impacts due to nearby developments

Cumulative impacts would be low because at the N2 and Gwaing Bridge are existing structures.

11.3 Conclusion on cumulative impacts due to surrounding developments:

It is unlikely that a cumulative effect could arise from this project, if current and future development mitigation measures is being implemented. It is unlikely that development will result in the reduced ability of the vegetation unit to meet its conservation targets as the conservation status of the vegetation is in a degraded state.

It is recommended that efforts on invasive species management, erosion control and rehabilitation is coordinated to avoid negative effects of one development on the environmental state on and around the other.

11.4 Impact risk factors for different phases of the project

Potential ecological impacts resulting from the development would stem from a variety of different activities and risk factors associated with the construction and operation phases of the project including the following:

a) Construction Phase

Vegetation clearing for the project, etc. could impact listed plant species and plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.

Erosion risk may result due to the loss of plant cover and soil disturbance created during the construction phase. Although the effects would probably only become apparent during the operation phase, the impact stems from the construction phase and suitable mitigation measures will also need to be applied at this stage.

Presence and operation of construction machinery on site will create a physical impact as well as generate dust and noise pollution and other forms of disturbance on site.

Loss of connectivity and habitat fragmentation may result due to the presence of the roads, site fencing and other support infrastructure of the development.

b) Operation Phase

The structure would generate some disturbance which may deter some fauna from the area. Maintenance activities such as vegetation clearing will impact the biodiversity of the site if not conducted in a sensitive manner.

12. ASSESSMENT OF IMPACTS

12.1 Impacts of the proposed Gwaing Bridge, access roads and associated infrastructure

ALTERNATIVE 1

Table 12.1: List of impacts

1. Activity: Upgrading and/or creation of site access roads and internal maintenance tracks.
Environmental Aspect: Removal of vegetation, compaction and disturbance of soils, creation of runoff zone, destruction of animal burrows, impact on protected species, alteration of soil surface properties
Environmental impact: Loss of vegetation, increase in runoff and erosion, possible distribution of alien invasive species, possible disturbance and reduction of habitat or injury to burrowing vertebrates, possible change of natural runoff and drainage patterns, possible loss of protected species, possible permanent loss of revegetation potential of soil surface. Note: relatively large access roads already exist to provide access to the site boundary.

	Without mitigation	With mitigation
Extent (E)	Local (2)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Low (4)	Minor (2)
Probability (P)	Highly Probable (4)	Highly Probable (4)
Significance (S = E+D+M)*P	Medium (40)	Low (28)
Status (positive, neutral or negative)	Negative	<ul style="list-style-type: none"> • Neutral where situated on transformed areas or on existing access roads. • Negative on undisturbed areas. • Minimal new negative impacts expected.
Reversibility	Not reversible	Relatively reversible
Irreplaceable loss of resources?	Probable	Not likely
Can impacts be mitigated?	Reasonably well	
<p>Mitigation:</p> <ul style="list-style-type: none"> • Animal burrows must be monitored by the ECO prior to construction for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professionals/contractor. • During construction create designated turning areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas. • Keep the clearing of natural and semi-natural grasslands to a minimum. • If filling material is to be used, this should be sourced from areas free of invasive species. • Topsoil (the upper 25 cm of soil) is an important natural resource with a seedbank; where it has to be stripped, never mix it with subsoil or any other material. Store and protect it separately until it can be re-used, and minimise the handling of the topsoil. • Reinforce portions of existing access routes that are prone to erosion, create structures or low berms to drain the access roads rapidly during rainfall events, yet preventing erosion of the track and surrounding areas. • Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (storm water and erosion management plan required). • Ensure adequate drainage where access roads cross drainage lines or ephemeral tributaries. • Prevent leakage of oil or other chemicals or any other form of pollution. • Monitor the establishment of (alien) invasive species and remove as soon as detected, before regenerative material can be formed. 		

<ul style="list-style-type: none"> After decommissioning, if access roads or portions thereof will not be of further use to the landowner, remove all foreign material and rip area to facilitate the establishment of vegetation, followed by a suitable revegetation program.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> Possible erosion of areas lower than the access roads, Possible contamination of lower-lying drainage lines, ephemeral tributaries and wetlands located outside of the project site due to oil or other spillage. Possible spread and establishment of alien invasive species.
<p>Residual impacts:</p> <ul style="list-style-type: none"> Altered vegetation composition and structure. Altered topsoil conditions. Potential barren areas. Potential for erosion and invasion by weed or alien species.

<p>2. Activity: Fencing area of area and maintenance road – may also serve as fire-break.</p>		
<p>Environmental Aspect: (Note: Fencing already exists in the area). Removal of vegetation, compaction of soils, creation of runoff zone, impact on protected species, impact on movement of terrestrial vertebrates.</p>		
<p>Environmental impact: Loss of vegetation and specifically protected or red data species, window of opportunity for the establishment of alien invasive species, altered topsoil characteristics prone to compaction, increased runoff and erosion, temporary disturbance of burrowing animals, possible reduction of habitat and forage availability to terrestrial vertebrates.</p>		
	Without mitigation	With mitigation
Extent (E)	Local (2)	Local (1)
Duration (D)	Long-term (4)	Long term (4)
Magnitude (M)	Low (4)	Small (0)
Probability (P)	Highly Probable (4)	Probable (3)
Significance (S = E+D+M)*P	Medium (40)	Low (15)
Status (positive, neutral or negative)	Negative	<ul style="list-style-type: none"> Neutral where present on transformed areas. Slightly Negative on natural areas. Minimal new negative impacts expected.
Reversibility	Partially reversible	Reversible
Irreplaceable loss of resources?	Probable	Not likely
Can impacts be mitigated?	Reasonably well	
<p>Mitigation:</p>		

- After the final layout has been approved, conduct a thorough footprint investigation to detect and map (by GPS) any protected plant species and animal burrows.
- Protected plant species (if present) must be relocated if possible.
- Animal burrows must be monitored by the ECO prior to construction for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor.
- During the design phase, the possible impact of burrowing vertebrates and rodents on the development must be determined, and fencing must be designed to either exclude these animal species if it will be detrimental or enable occasional migration of smaller vertebrates onto and across the site (which could be beneficial to small vertebrate populations).
- Minimise the area affected, especially during construction.
- During construction strictly prohibit any off-road driving or parking of vehicles and machinery outside the footprint areas.
- Prevent leakage of oil or other chemicals.
- Strictly prohibit littering of any kind.
- Monitor the establishment of alien and indigenous invasive species and remove as soon as detected, whenever possible before regenerative material can be formed.
- If the area will be used as a fire-break, maintain a suitably low grass layer by regular mowing or appropriate species selection, but do not leave soil bare. Alternatively, ensure that the soil is covered to prevent erosion.

Cumulative impacts:

- Possible erosion of cleared areas and associated accelerated erosion from surrounding areas.
- Possible loss of ecosystem functioning due to an increase in invasive species.

Residual impacts:

- Altered vegetation composition.
- Compacted topsoil.
- Possibility for erosion and invasion by alien invasive species.

3. Activity: Construction and operation of structures and loading zones on semi-natural vegetation and disturbed areas

Environmental Aspect: Removal of or excessive damage to vegetation, compaction of topsoil, creation of runoff zone, redistribution and concentration of runoff from surfaces, displacement of terrestrial vertebrates, reduced buffering capacities of the landscapes during extreme weather events.

Environmental impact: Loss of vegetation and/or species of conservation concern, loss of and alteration of microhabitats, altered vegetation cover, site-specific altered distribution of rainfall and resultant runoff patterns, general increase in runoff from hard surfaces and/or bare areas and associated accelerated erosion, reduction of habitat and resource availability for terrestrial fauna, possible increase of detrimental effects during periods of extreme weather events, e.g. increased flooding, severe erosion or dust due to lower buffering capacity of sparser vegetation

	Without mitigation	With mitigation
Extent (E)	Local (2)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Moderate (6)	Low (4)

Probability (P)	Definite (5)	Definite (5)
Significance (S = E+D+M)*P	High (60)	Medium (45)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Highly Probable	Slight Probability
Can impacts be mitigated?	Reasonably	
<p>Mitigation:</p> <ul style="list-style-type: none"> • After the final layout has been approved, conduct a thorough footprint investigation to detect and map (by GPS) any protected plant species and active animal burrows. • Protected plant species must be relocated if possible. • Animal burrows must be monitored by the ECO prior to construction for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor. • Keep areas affected to a minimum, strictly prohibit any disturbance outside the demarcated footprint area. • Clear as little indigenous vegetation as possible, aim to maintain vegetation where it will not interfere with the construction or operation of the development, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations of the relevant EMP, if possible. • Use only species that were part of the original indigenous species composition as listed in the specialist report. • Remove all invasive vegetation before and after construction and continuously up to decommissioning. • If filling material is to be used, this should be sourced from areas free of invasive species. • Topsoil (the upper 25 cm of soil) is an important natural resource; where it must be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise the handling of topsoil. • Temporarily stored topsoil must be re-applied within 6 months, topsoil stored for longer need to be managed according to a detailed topsoil management plan. • Monitor the area regularly after larger rainfall events to determine where erosion may be initiated and then mitigate by modifying the soil micro-topography and revegetation or soil erosion control efforts accordingly. • Prevent leakage of oil or other chemicals, and strictly prohibit littering of any kind. • Monitor the establishment of all invasive species and remove as soon as detected, whenever possible before regenerative material can be formed 		
<p>Cumulative impacts:</p> <p>If mitigation measures are not strictly followed the following could occur:</p> <ul style="list-style-type: none"> • erosion of areas and continued erosion of the development area with associated siltation and/or erosion of lower-lying wetlands located outside of the project site. • contamination of drainage lines, lower-lying rivers or wetlands located outside of the project site. • alteration of occupancy by terrestrial fauna beyond the project site, possible reduction of available habitat and food availability to terrestrial fauna. 		

- spread and establishment of invasive species.

Residual impacts:

- Altered topsoil characteristics.
- Altered vegetation composition.

4. Activity: Temporary construction camps and sites where machinery is kept during construction.

Environmental Aspect: Removal of vegetation, compaction of soils, creation of runoff zone, displacement of terrestrial vertebrates, possible contamination of topsoil and groundwater by chemicals or oils.

Environmental impact: Loss of vegetation and/or species of conservation concern, loss of microhabitats, altered vegetation cover, altered distribution of rainfall and resultant runoff patterns, increase in concentrated runoff from sealed or compacted surfaces and possibly higher accelerated erosion, reduction of habitat and resource availability for terrestrial fauna, possible contaminated topsoil, possible contaminated ground water or wetlands located outside of the project site.

	Without mitigation	With mitigation
Extent (E)	Regional (4)	Local (1)
Duration (D)	Medium-term (3)	Short-term (2)
Magnitude (M)	Moderate (6)	Minor (2)
Probability (P)	Definite (5)	Probable (3)
Significance (S = E+D+M)*P	High (65)	Low (15)
Status (positive, neutral or negative)	Negative	Slightly Negative
Reversibility	Partially reversible	Reversible
Irreplaceable loss of resources?	Probable	Not likely
Can impacts be mitigated?	Reasonably	

Mitigation:

- After the final layout has been approved, conduct a thorough footprint investigation to detect and map (by GPS) any protected plant species and animal burrows.
- Protected plant species must be relocated where deemed necessary.
- Animal burrows must be monitored by the ECO prior to construction for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor.
- Place infrastructure as far as possible on sites that have been transformed already.
- Stay within demarcated temporary construction areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas.
- Prevent spillage of construction material and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPr.

- No fires may be lit for cooking or any other purposes.
- Facilities may not be used as staff accommodation.
- Topsoil (the upper 25 cm of soil) is an important natural resource; where it must be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil.
- Temporarily stored topsoil must be re-applied within 6 months, topsoil stored for longer need to be managed according to a detailed topsoil management plan.
- After construction remove all foreign material prior to starting the rehabilitation.
- Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed.

Cumulative impacts:

If mitigation measures are not strictly followed the following could occur:

- erosion of the development area with associated siltation and/or erosion of lower-lying ephemeral streams and downstream wetlands located outside of the project site.
- contamination of drainage lines, lower-lying ephemeral streams and wetlands located outside of the project site.
- contamination of groundwater which is an extremely important source of water supply for the region.
- spread and establishment of invasive species.
- alteration of occupancy by terrestrial fauna, small reduction of available habitat and food availability to terrestrial fauna.

Residual impacts:

- Altered topsoil characteristics.
- Altered vegetation composition.

5. Activity: Transport of materials to site, movement of vehicles on site during construction and operation.

Environmental Aspect: Compaction of soils, possible contamination by oils or fuels, possible introduction and spread of weeds and alien invasive species, temporary disturbance of terrestrial fauna.

Environmental impact: Loss of vegetation, increase in runoff and erosion, disturbance or possible mortality incidents of terrestrial fauna, possible contamination of soil and groundwater by oil- or fuel spillages, possible establishment and spread of undesirable weeds and alien invasive species that could further damage ecosystem functionality.

	Without mitigation	With mitigation
Extent (E)	Regional (4)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Low (4)	Small (0)
Probability (P)	Definite (5)	Highly Probable (4)
Significance (S = E+D+M)*P	Medium (60)	Low (20)
Status (positive, neutral or negative)	Negative	Neutral

Reversibility	Partially reversible	Reversible
Irreplaceable loss of resources?	Probable	Not likely
Can impacts be mitigated?	Reasonably	
Mitigation: <ul style="list-style-type: none"> Restrict all movement of vehicles and heavy machinery to permissible areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed. Parking areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary stormwater control) if oil and fuel spillages are highly likely to occur. Strict speed limits must be set and adhered to. Driving between dusk and dawn should be permissible to emergency situations only. Prevent spillage of any, oils or other chemicals, strictly prohibit other pollution. Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed, destroy all material to prevent re-establishment. 		
Cumulative impacts: <ul style="list-style-type: none"> Possible pollution of surrounding areas if no mitigation is implemented. Contamination of groundwater which is an extremely important source of water supply for the region. Possible spread of alien invasive species beyond the site if no mitigation is implemented. 		
Residual impacts: <ul style="list-style-type: none"> Related to access roads and internal maintenance tracks only. 		

5. Activity: Impacts on ephemeral streams and drainage lines.		
Environmental Aspect: Removal of vegetation, compaction of soils, and creation of runoff zone will contribute to increased erosion unless the barren area are revegetated properly, possible contamination of topsoil and groundwater by chemicals or oils.		
Environmental impact: A decline in ecosystem functionality of wetlands and riparian areas of smaller drainage lines will impact small and larger drainage lines and wetlands, while also reducing the ability of the environment to buffer effects of extreme climatic events.		
	Without mitigation	With mitigation
Extent (E)	Regional (4)	Local (1)
Duration (D)	Medium-term (3)	Short-term (2)
Magnitude (M)	Moderate (6)	Minor (2)
Probability (P)	Definite (5)	Probable (3)
Significance (S = E+D+M)*P	High (65)	Low (15)
Status (positive, neutral or negative)	Negative	Slightly Negative
Reversibility	Partially reversible	Reversible

Irreplaceable loss of resources?	Probable	Not likely
Can impacts be mitigated?	Reasonably	
<p>Mitigation:</p> <ul style="list-style-type: none"> • After the final layout has been approved, conduct a thorough footprint investigation to detect and map (by GPS) any protected plant species and animal burrows. • Protected plant species must be relocated where deemed necessary. • Place infrastructure as far as possible on sites that have been transformed already. • Stay within demarcated temporary construction areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas. • Prevent spillage of construction material and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPPr. • No fires may be lit for cooking or any other purposes. • After construction remove all foreign material prior to starting the rehabilitation. • Monitor the establishment of invasive species and remove as soon as detected, whenever possible before regenerative material can be formed. 		
<p>Cumulative impacts:</p> <p>If mitigation measures are not strictly followed the following could occur:</p> <ul style="list-style-type: none"> • erosion of the development area with associated siltation and/or erosion of lower-lying ephemeral streams and downstream wetlands located outside of the project site. • contamination of drainage lines, lower-lying ephemeral streams and wetlands located outside of the project site. • contamination of groundwater which is an extremely important source of water supply for the region. • spread and establishment of invasive species. • alteration of occupancy by terrestrial fauna, small reduction of available habitat and food availability to terrestrial fauna. 		
<p>Residual impacts:</p> <ul style="list-style-type: none"> • Altered topsoil characteristics. • Altered vegetation composition. • Altered wetlands and stream ecosystem function 		

Assessment of Cumulative Impacts

1. Nature: Reduced Ability to meet conservation targets		
Environmental Aspect: Reduced ability to meet conservation targets of the Province.		
Environmental impact: The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets. Although the vegetation type in the study area are classified as Endangered, it is poorly protected and certain habitats or communities may be subsequently affected.		
	Overall impact of the proposed project considered in isolation	Cumulative Impact of the project and other projects in the area
Extent (E)	Local (1)	Local (2)

Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Small (0)	Low (3)
Probability (P)	Very Improbable (1)	Probable (2)
Significance (S = E+D+M)*P	Low (5)	Low (18)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Low reversibility
Irreplaceable loss of resources?	Not Likely	Probable
Confidence in finding	High	
Mitigation: <ul style="list-style-type: none"> • Implementation of the required mitigation measures for all developments within the area. • Preconstruction walk-through to ensure that sensitive habitats are avoided. • Minimise the development footprint as far as possible. 		

ALTERNATIVE SITES (Fig 6.3 & 6.4)

The alternative sites (2 & 3) is situated in the same vegetation type and in the same area and all the impacts as listed for the preferred site (Alternative 1) are also applicable to these other alternative sites (2 & 3).

It must be noted that Alternatives 2 & 3 would have a larger impact upon a seasonal stream which drains the southern side of the N2.

12.2 Implications of the anticipated impacts for site

The proposed development will have an impact on the above-ground ecology of the site. The impacts will however be low due to the relatively narrow footprint of the project site and it will also be reduced with the implementation of mitigation measures.

Potentially significant negative impacts on the ecological environment could be soil degradation issues because of steep slopes, construction activity; possible introduction of alien invasive plants, a long-term (more than 8 months) low or absent vegetation cover after construction and impacts on protected plant species.

With the diligent implementation of mitigating measures by the contractors, and operational staff, the severity of these impacts can be minimised and reduced to acceptable levels. The impact on fauna is expected to be small to negligible. Presence of indigenous terrestrial vertebrates within the study area is relatively low. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety

specifications necessitated by the development. No restricted or specific habitat of vertebrates exist on the project site that will be affected by the proposed development.

13 DISCUSSION AND CONCLUSION

The proposed upgrading of the bridge over the Gwaing River near George triggers a number of listed activities as included in the Environmental Impact Assessment Regulations (08 December 2014), GN R 982 – 985, in accordance with the National Environmental Management Act, No. 107 of 1998 (NEMA), as amended. The appointed Environmental Assessment Practitioner, KSEMS Environmental Consulting (Pty) Ltd, commissioned EnviroNiche Consulting, to undertake a floristic impact assessment to determine the impacts which may be triggered by the proposed development. The requirements of this assessment were to undertake a specialist study to assess the floristic biodiversity and ecology of this proposed development as well as to determine the significance of the impacts this proposed widening of the bridge will have within the identified project site.

The project site is a 30m wide corridor situated on both sides of the Gwaing River. Three alternative options were investigated. Alternative 1 (preferred option) is to widen the existing bridge on the northern side (upstream of the existing bridge). Alternative 2 is to widen the bridge a few metres on both sides. Alternative 3 is to widen the bridge on the southern side of the existing bridge.

The ancient coastal terrace between the Outeniqua Mountains and the present coastline has been eroded over millions of years to form an extensive undulating coastal plain dissected by numerous streams. This created a landscape of roundish crests, gentle slopes and relatively deep valleys. Almost all the vegetation types on this coastal plain around George are listed as Critical Biodiversity Areas (CBAs) and threatened ecosystems. Agricultural activities (crop, planted pasture production), forestry (pine & bluegum plantations) as well as alien invasive plants have destroyed almost the entire region's natural vegetation. A few isolated pockets of natural vegetation remain in those areas unsuitable for crop production.

The Gwaing bridge is situated in the Garden Route Granite Fynbos (Status: Critically Endangered) vegetation type on the crests and plains. The Gwaing River valley is dominated by the Cape Lowland Alluvial Vegetation (Status: Critically Endangered). This particular vegetation type is dominated by shrubs and trees which occur along the steep slopes and in deep sheltered valleys. Pockets of Southern Afromontane Forest (Least Threatened) also occur along the slopes of the Gwaing River. The Gwaing River is also classified as a NFEPA-listed perennial streams.

The entire landscape around the Gwaing Bridge and along the N2 has been transformed. Almost all areas, with arable soil, have been ploughed and subsequently the natural vegetation has been

destroyed. The riparian vegetation along the Gwaing River has been invaded by alien tree and shrub species. Very few of the original vegetation remains. According to the Plants of South Africa species list (POSA) the total number of Red Data plant species present in the quarter degree square in which the project site falls is 74.

From an ecological perspective Alternative 1 is the preferred option. Alternatives 2 and 3 would have impacts on an unnamed, seasonal stream which drains the area on the southern side of the N2 and the Gwaing Bridge.

13.1 No-go Option

The No-Go Option means that the status quo in terms of ecosystem functioning and the existence of protected species remains on the project site as the proposed project will not be constructed.

However, if the no-go option is applied then the narrow Gwaing Bridge will remain as it is which pose a threat to motorists using the N2.

Therefore, due to the acceptability of the project site for the development and the overall low sensitivity of the project site the no-go option is not considered as being feasible and is therefore not recommended.

13.2 The most significant potential impacts expected are:

The following impacts are considered to be the most significant regarding the development of the project:

- Destruction of the natural vegetation.
- Reduction of a stable vegetation cover. Without this vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- Disturbed vegetation in the project site carries a high risk of invasion by alien invasive plants, which may or may not be present in the project site or in close proximity to the project site. The control and continuous monitoring and eradication of alien invasive plants will form an integral part of the environmental management of the facility from construction to decommissioning.
- Possible impacts on the nearby drainage lines that may be present outside of the project site. This may influence species depending on these parts of the ecosystem, as well as downstream wetland ecosystems.

14. RECOMMENDATIONS

The following is recommended:

General

- An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly;
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to;
- The areas to be cleared as well as the construction area should be clearly demarcated;
- All construction vehicles should adhere to clearly defined and demarcated roads and parking areas;
- Dust suppression and erosion management should be an integrated component of the construction approach;
- No dumping of building waste or spoil material from the development should take place on areas other than a nearby licenced landfill site;
- All hazardous materials should be stored appropriately to prevent contamination of the project site. Any accidental chemical, fuel and oil spills that occur at the project site should be cleaned up appropriately as related to the nature of the spill;

Flora

- Bush clearing must be kept to the minimum. This is to protect the rare shrubs and other plants
- There should be a preconstruction walk-through of the development footprint/project site in order to assess the area for Red Data and protected species especially bulbous and succulent species which could be transplanted.
- Weed control measures must be applied to eradicate the noxious weeds (category 1a & 1b species) on disturbed areas.

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ANNEXURE A: Photos of the project site and alternatives



Figure A1: View of the northern (upstream) side of the bridge. The *Eucalyptus* trees (exotic species) will have to be removed in case Alternative 1 is selected.



Figure A2: View of the bridge from the western side. The shrub vegetation in the foreground will be destroyed in case Alternative 1 is selected.



Figure A3: View of the seasonal drainage line on the southern side of the N2. Alternative 3 would impact negatively upon this sensitive system.



Figure A4: Riparian vegetation invaded by exotic *Eucalyptus* and *Acacia* trees.



Figure A5: Fynbos species such as *Erica formosa* grow on the man-made embankment of the existing N2 road. These species could colonise the new embankment again after construction



Figure A6: A noxious aquatic invader *Salvia molesta* completely covering a pool under the Gwaing Bridge



Figure A7: View of the eastern embankment which will be partially removed in case Alternative 1 is selected. The trees are *Harpephyllum caffrum* which were planted as part of the previous revegetation activity.



Figure A8: View of the northern (upstream) side of the bridge. Note the existing disturbance of the river bed and banks.

ANNEXURE B:

Alternative sites 1, 2, 3: List of plant species noted on site during survey.

Colours Relate as follows:

Protected species: yellow

Red Data species: Red

* indicates exotic species

No	Name	Growth form	Invasive classification
1	*Acacia cyclops	Shrub	1b
2	*Acacia mearnsii	Tree	1b
3	Aloe arborescens	Succulent	
4	Anagalis arvensis	Forb	
5	Anthospermum aethiopicum	Shrub	
6	Asparagus falcatus	Climber	
7	Briza major	Grass	
8	Carpobrotus deliciosus	Succulent	
9	Chrysanthemoides monilifera	Shrub	
10	Commelina africana	Forb	
11	Cynanchum ellipticum	Climber	
12	Dianthus caespitosus	Forb	
13	Diospyros dichrophylla	Shrub	
14	Eragrostis plana	Grass	
15	Erica canaliculata	Shrub	
16	Erica discolor	Shrub	
17	Erica formosa	Shrub	
18	Erica hebecalyx	Shrub	
19	Erica leucopelta	Shrub	
20	*Eucalyptus meliodora	Tree	1b
21	Fumaria officinalis	Climber	
22	Gazania rigens	Forb	
23	Gymnosporea buxifolia	Shrub	
24	Halleria lucida	Shrub	
25	Helichrysum odoratissimum	Forb	
26	Hermannia hyssopifolia	Shrub	
27	Hyparrhenia hirta	Grass	
28	*Hypochaeris radicata	Forb	Exotic weed
29	Hypoxis sobolifera	Geophyte	
30	Indigofera porrecta	Shrub	

31	*Lolium perenne	Grass	
32	Metalasia pungens	Shrub	
33	Olea europaea subsp africana	Shrub	
34	Oxalis incarnate	Forb	
35	Oxalis pes-caprae	Forb	
36	Plantago crassifolia	Forb	
37	Pteridium aquilinum	Fern	
38	Rhamnus prinoides	Shrub	
39	*Rubus rigidus	Shrub	1b
40	Rumex angiocarpus	Weed	
41	*Salvinia molesta	Macrophyte	1b
42	Scutia myrtina	Shrub	
43	Searsia chirindensis	Shrub	
44	Searsia glauca	Shrub	
45	Searsia lucida	Shrub	
46	Secamone galpinii	Climber	
47	*Sisymbrium officinalis	Weed	
48	*Solanum mauritianum	Shrub	1b
49	Tarchonanthus littoralis	Shrub	
50	Trifolium burchellianum	Forb	
51	*Verbena bonariensis	Weed	1b
52	Watsonia aletooides	Geophyte	
53	Zanthedescia aethiopica	Geophyte	

ANNEXURE C:

Alternative sites 1, 2, 3: List of plant species of quarter degree square. List derived from the POSA website

Colours Relate as follows:

Protected species: yellow

Red Data species: Red

* indicates exotic species

Family	Species	Threat status
ACANTHACEAE	Barleria pungens L.f.	LC
ACANTHACEAE	Hypoestes aristata (Vahl) Sol. ex Roem. & Schult. var. aristata	LC
ACANTHACEAE	Hypoestes aristata (Vahl) Sol. ex Roem. & Schult.	LC

AIZOACEAE	<i>Tetragonia fruticosa</i> L.	LC
AIZOACEAE	<i>Tetragonia virgata</i> Schltr.	LC
ANACARDIACEAE	<i>Searsia crenata</i> (Thunb.) Moffett	LC
ANACARDIACEAE	<i>Searsia glauca</i> (Thunb.) Moffett	LC
ANACARDIACEAE	<i>Searsia lucida</i> (L.) F.A.Barkley forma <i>lucida</i>	Not Evaluated
ANTHERICACEAE	<i>Chlorophytum cooperi</i> (Baker) Nordal	LC
APIACEAE	<i>Centella virgata</i> (L.f.) Drude var. <i>virgata</i>	LC
APOCYNACEAE	<i>Tylophora cordata</i> (Thunb.) Druce	LC
ARCHIDIACEAE	<i>Archidium ohioense</i> Schimp. ex Müll.Hal.	
ASPHODELACEAE	<i>Bulbine lagopus</i> (Thunb.) N.E.Br.	LC
ASPLENIACEAE	<i>Asplenium adiantum-nigrum</i> L. var. <i>adiantum-nigrum</i>	LC
ASPLENIACEAE	<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	LC
ASPLENIACEAE	<i>Asplenium rutifolium</i> (P.J.Bergius) Kunze	LC
ASTERACEAE	<i>Arctotheca prostrata</i> (Salisb.) Britten	LC
ASTERACEAE	<i>Athanasia juncea</i> (DC.) D.Dietr.	LC
ASTERACEAE	<i>Athanasia microcephala</i> (DC.) D.Dietr.	LC
ASTERACEAE	<i>Athanasia trifurcata</i> (L.) L.	LC
ASTERACEAE	<i>Athrixia capensis</i> Ker Gawl.	LC
ASTERACEAE	<i>Berkheya armata</i> (Vahl) Druce	LC
ASTERACEAE	<i>Chrysanthemoides monilifera</i> (L.) Norl. subsp. <i>pisifera</i> (L.) Norl.	LC
ASTERACEAE	<i>Cineraria lobata</i> L'Hér. subsp. <i>lobata</i>	LC
ASTERACEAE	<i>Corymbium glabrum</i> L. var. <i>glabrum</i>	LC
ASTERACEAE	<i>Cotula coronopifolia</i> L.	LC
ASTERACEAE	<i>Didelta carnosa</i> (L.f.) Aiton var. <i>tomentosa</i> (Less.) Roessler	LC
ASTERACEAE	<i>Disparago kraussii</i> Sch.Bip.	LC
ASTERACEAE	<i>Eriocephalus africanus</i> L. var. <i>africanus</i>	LC
ASTERACEAE	<i>Felicia aethiopica</i> (Burm.f.) Bolus & Wolley-Dod ex Adamson & T.M.Salter	LC
ASTERACEAE	<i>Felicia amoena</i> (Sch.Bip.) Levyns subsp. <i>latifolia</i> Grau	LC
ASTERACEAE	<i>Felicia filifolia</i> (Vent.) Burt Davy subsp. <i>bodkinii</i> (Compton) Grau	LC
ASTERACEAE	<i>Gazania rigens</i> (L.) Gaertn. var. <i>uniflora</i> (L.f.) Roessler	LC
ASTERACEAE	<i>Gerbera serrata</i> (Thunb.) Druce	LC
ASTERACEAE	<i>Helichrysum anomalum</i> Less.	LC
ASTERACEAE	<i>Helichrysum asperum</i> (Thunb.) Hilliard & B.L.Burt	LC
ASTERACEAE	<i>Helichrysum cymosum</i> (L.) D.Don subsp. <i>cymosum</i>	LC
ASTERACEAE	<i>Helichrysum felinum</i> Less.	LC
ASTERACEAE	<i>Helichrysum patulum</i> (L.) D.Don	LC
ASTERACEAE	<i>Helichrysum spiralepis</i> Hilliard & B.L.Burt	LC
ASTERACEAE	<i>Helichrysum teretifolium</i> (L.) D.Don	LC
ASTERACEAE	<i>Metalasia acuta</i> P.O.Karis	LC
ASTERACEAE	<i>Metalasia densa</i> (Lam.) P.O.Karis	LC
ASTERACEAE	<i>Metalasia pungens</i> D.Don	LC
ASTERACEAE	<i>Oedera capensis</i> (L.) Druce	LC
ASTERACEAE	<i>Oedera imbricata</i> Lam.	LC
ASTERACEAE	<i>Oldenburgia paradoxa</i> Less.	LC
ASTERACEAE	<i>Plecostachys serpyllifolia</i> (P.J.Bergius) Hilliard & B.L.Burt	LC
ASTERACEAE	<i>Printzia polifolia</i> (L.) Hutch.	LC
ASTERACEAE	<i>Relhania calycina</i> (L.f.) L'Hér. subsp. <i>calycina</i>	LC

ASTERACEAE	<i>Relhania pungens</i> L'Hér. subsp. <i>pungens</i>	LC
ASTERACEAE	<i>Senecio angulatus</i> L.f.	LC
ASTERACEAE	<i>Senecio deltoideus</i> Less.	LC
ASTERACEAE	<i>Senecio ilicifolius</i> L.	LC
ASTERACEAE	<i>Stoebe microphylla</i> DC.	LC
ASTERACEAE	<i>Syncarpha paniculata</i> (L.) B.Nord.	LC
ASTERACEAE	<i>Tarchonanthus littoralis</i> P.P.J.Herman	LC
ASTERACEAE	<i>Ursinia heterodonta</i> (DC.) N.E.Br.	LC
BRASSICACEAE	<i>Heliophila subulata</i> Burch. ex DC.	LC
CAMPANULACEAE	<i>Wahlenbergia desmantha</i> Lambers	LC
CARYOPHYLLACEAE	<i>Silene eckloniana</i> Sond.	LC
CARYOPHYLLACEAE	<i>Silene undulata</i> Aiton	LC
CARYOPHYLLACEAE	* <i>Spergula arvensis</i> L.	Not Evaluated
CATAGONIACEAE	<i>Catagonium nitens</i> (Brid.) Cardot subsp. <i>maritimum</i> (Hook.) S.H.Lin	
CELASTRACEAE	<i>Cassine peragua</i> L. subsp. <i>peragua</i>	LC
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	Declining
CELASTRACEAE	<i>Maytenus procumbens</i> (L.f.) Loes.	LC
CELASTRACEAE	<i>Pterocelastrus tricuspidatus</i> (Lam.) Walp.	LC
CELASTRACEAE	<i>Putterlickia pyracantha</i> (L.) Szyszyl.	LC
CHENOPODIACEAE	<i>Sarcocornia natalensis</i> (Bunge ex Ung.-Sternb.) A.J.Scott	LC
CLADONIACEAE	<i>Cladia aggregata</i> (Sw.) Nyl.	
COLCHICACEAE	<i>Ornithoglossum vulgare</i> B.Nord.	LC
CONVOLVULACEAE	<i>Falkia repens</i> Thunb.	LC
CRASSULACEAE	<i>Adromischus caryophyllaceus</i> (Burm.f.) Lem.	LC
CRASSULACEAE	<i>Crassula atropurpurea</i> (Haw.) D.Dietr. var. <i>atropurpurea</i>	LC
CRASSULACEAE	<i>Crassula biplanata</i> Haw.	LC
CRASSULACEAE	<i>Crassula decumbens</i> Thunb. var. <i>brachyphylla</i> (Adamson) Toelken	NT
CRASSULACEAE	<i>Crassula lactea</i> Sol.	LC
CRASSULACEAE	<i>Crassula nudicaulis</i> L. var. <i>nudicaulis</i>	LC
CRASSULACEAE	<i>Crassula orbicularis</i> L.	LC
CRASSULACEAE	<i>Crassula perforata</i> Thunb. subsp. <i>perforata</i>	LC
CRASSULACEAE	<i>Crassula rubricaulis</i> Eckl. & Zeyh.	LC
CRASSULACEAE	<i>Crassula rupestris</i> Thunb. subsp. <i>rupestris</i>	LC
CRASSULACEAE	<i>Crassula southii</i> Schönland subsp. <i>sphaerocephala</i> Toelken	LC
CRASSULACEAE	<i>Crassula subulata</i> L. var. <i>fastigiata</i> (Schönland) Toelken	LC
CRASSULACEAE	<i>Crassula tetragona</i> L. subsp. <i>rudis</i> (Schönland & Baker f.) Toelken	LC
CYPERACEAE	<i>Cyperus congestus</i> Vahl	LC
CYPERACEAE	<i>Cyperus thunbergii</i> Vahl	LC
CYPERACEAE	<i>Ficinia gracilis</i> Schrad.	LC
CYPERACEAE	<i>Ficinia laciniata</i> (Thunb.) Nees	LC
CYPERACEAE	<i>Ficinia lateralis</i> (Vahl) Kunth	LC
CYPERACEAE	<i>Ficinia nigrescens</i> (Schrad.) J.Raynal	LC
CYPERACEAE	<i>Ficinia repens</i> (Nees) Kunth	LC
CYPERACEAE	<i>Ficinia tristachya</i> (Rottb.) Nees	LC
CYPERACEAE	<i>Isolepis cernua</i> (Vahl) Roem. & Schult. var. <i>cernua</i>	LC
CYPERACEAE	<i>Isolepis tenuissima</i> (Nees) Kunth	LC

CYPERACEAE	<i>Pycreus polystachyos</i> (Rottb.) P.Beauv. var. <i>polystachyos</i>	LC
CYPERACEAE	<i>Tetraria bolusii</i> C.B.Clarke	LC
CYPERACEAE	<i>Tetraria cuspidata</i> (Rottb.) C.B.Clarke var. <i>cuspidata</i>	LC
CYPERACEAE	<i>Tetraria microstachys</i> (Vahl) H.Pfeiff.	LC
CYPERACEAE	<i>Tetraria robusta</i> (Kunth) C.B.Clarke	LC
CYTINACEAE	<i>Cytinus sanguineus</i> (Thunb.) Fourc.	LC
EBENACEAE	<i>Diospyros dichrophylla</i> (Gand.) De Winter	LC
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC
ERICACEAE	<i>Erica axillaris</i> Thunb.	LC
ERICACEAE	<i>Erica canaliculata</i> Andrews	LC
ERICACEAE	<i>Erica cerinthoides</i> L. var. <i>cerinthoides</i>	LC
ERICACEAE	<i>Erica curviflora</i> L.	LC
ERICACEAE	<i>Erica ericoides</i> (L.) E.G.H.Oliv.	LC
ERICACEAE	<i>Erica formosa</i> Thunb.	LC
ERICACEAE	<i>Erica glandulosa</i> Thunb. subsp. <i>fourcadei</i>	VU
ERICACEAE	<i>Erica glandulosa</i> Thunb. subsp. <i>glandulosa</i>	LC
ERICACEAE	<i>Erica hispidula</i> L. var. <i>hispidula</i>	LC
ERICACEAE	<i>Erica imbricata</i> L.	LC
ERICACEAE	<i>Erica opulenta</i> (J.C.Wendl. ex Klotzsch) Benth.	LC
ERICACEAE	<i>Erica peltata</i> Andrews	LC
ERICACEAE	<i>Erica quadrangularis</i> Salisb.	LC
ERICACEAE	<i>Erica scabriuscula</i> Lodd.	LC
ERICACEAE	<i>Erica sessiliflora</i> L.f.	LC
ERICACEAE	<i>Erica triceps</i> Link	LC
ERICACEAE	<i>Erica uberiflora</i> E.G.H.Oliv.	LC
ERIOSPERMACEAE	<i>Eriospermum cordiforme</i> Salter	LC
EUPHORBIACEAE	<i>Adenocline acuta</i> (Thunb.) Baill.	LC
EUPHORBIACEAE	<i>Clutia laxa</i> Eckl. ex Sond.	LC
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>franksiae</i> Prain	LC
EUPHORBIACEAE	<i>Euphorbia barnardii</i> A.C.White, R.A.Dyer & B.Sloane	EN
EUPHORBIACEAE	<i>Euphorbia heptagona</i> L. var. <i>heptagona</i>	LC
FABACEAE	* <i>Acacia cyclops</i> A.Cunn. ex G.Don	Not Evaluated
FABACEAE	* <i>Acacia meamsii</i> De Wild.	Not Evaluated
FABACEAE	<i>Amphithalea fourcadei</i> Compton	LC
FABACEAE	<i>Aspalathus opaca</i> Eckl. & Zeyh. subsp. <i>pappeana</i> (Harv.) R.Dahlgren	LC
FABACEAE	<i>Hypocalyptus oxalidifolius</i> (Sims) Baill.	LC
FABACEAE	<i>Indigofera heterophylla</i> Thunb.	LC
FABACEAE	<i>Indigofera procumbens</i> L.	LC
FABACEAE	<i>Indigofera stricta</i> L.f.	LC
FABACEAE	<i>Lotononis umbellata</i> (L.) Benth.	LC
FABACEAE	* <i>Lotus subbiflorus</i> Lag. subsp. <i>subbiflorus</i>	Not Evaluated
FABACEAE	<i>Otholobium sericeum</i> (Poir.) C.H.Stirt.	LC
FABACEAE	<i>Podalyria burchellii</i> DC.	LC
FABACEAE	<i>Psoralea triflora</i> Thunb.	LC
FABACEAE	<i>Rhynchosia capensis</i> (Burm.f.) Schinz	LC
FABACEAE	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC

FABACEAE	* <i>Senna multiglandulosa</i> (Jacq.) H.S.Irwin & Barneby	Not Evaluated
FABACEAE	* <i>Senna occidentalis</i> (L.) Link	Not Evaluated
FABACEAE	* <i>Trifolium dubium</i> Sibth.	Not Evaluated
FABACEAE	* <i>Vicia sativa</i> L. subsp. <i>sativa</i>	Not Evaluated
FABACEAE	<i>Virgilia divaricata</i> Adamson	LC
FOSSOMBRONIACEAE	<i>Fossombronia crispa</i> Nees	
FUMARIACEAE	* <i>Fumaria muralis</i> Sond. ex W.D.J.Koch subsp. <i>muralis</i>	Not Evaluated
FUNARIACEAE	<i>Funaria hygrometrica</i> Hedw.	
GENTIANACEAE	<i>Chironia baccifera</i> L.	LC
GENTIANACEAE	<i>Chironia melampyrifolia</i> Lam.	LC
GERANIACEAE	<i>Geranium incanum</i> Burm.f. var. <i>incanum</i>	LC
GERANIACEAE	<i>Pelargonium candicans</i> Spreng.	LC
GERANIACEAE	<i>Pelargonium capitatum</i> (L.) L'Hér.	LC
GERANIACEAE	<i>Pelargonium caucalifolium</i> Jacq. subsp. <i>convolvulifolium</i>	LC
GERANIACEAE	<i>Pelargonium fruticosum</i> (Cav.) Willd.	LC
GERANIACEAE	<i>Pelargonium peltatum</i> (L.) L'Hér.	LC
GERANIACEAE	<i>Pelargonium triste</i> (L.) L'Hér.	LC
HAEMODORACEAE	<i>Dilatris ixioides</i> Lam.	LC
HYACINTHACEAE	<i>Lachenalia bulbifera</i> (Cirillo) Engl.	LC
HYACINTHACEAE	<i>Ornithogalum dubium</i> Houtt.	LC
HYPOXIDACEAE	<i>Hypoxis sobolifera</i> Jacq. var. <i>sobolifera</i> (Jacq.) Nel	LC
HYPOXIDACEAE	<i>Spiloxene flaccida</i> (Nel) Garside	LC
IRIDACEAE	<i>Babiana fourcadei</i> G.J.Lewis	LC
IRIDACEAE	<i>Babiana patersoniae</i> L.Bolus	LC
IRIDACEAE	<i>Bobartia aphylla</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Bobartia robusta</i> Baker	LC
IRIDACEAE	<i>Chasmanthe aethiopica</i> (L.) N.E.Br.	LC
IRIDACEAE	<i>Gladiolus carneus</i> D.Delaroche	LC
IRIDACEAE	<i>Gladiolus canoniensis</i> (L.) Gaertn.	LC
IRIDACEAE	<i>Gladiolus grandiflorus</i> Andrews	LC
IRIDACEAE	<i>Gladiolus gueinzii</i> Kunze	LC
IRIDACEAE	<i>Gladiolus liliaceus</i> Houtt.	LC
IRIDACEAE	<i>Hesperantha falcata</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Ixia orientalis</i> L.Bolus	LC
IRIDACEAE	<i>Lapeirousia anceps</i> (L.f.) Ker Gawl.	LC
IRIDACEAE	<i>Melaspheerula ramosa</i> (L.) N.E.Br.	LC
IRIDACEAE	<i>Micranthus alopecuroides</i> (L.) Rothm.	LC
IRIDACEAE	<i>Moraea reticulata</i> Goldblatt	LC
IRIDACEAE	<i>Tritoniopsis antholyza</i> (Poir.) Goldblatt	LC
IRIDACEAE	<i>Tritoniopsis caffra</i> (Ker Gawl. ex Baker) Goldblatt	LC
IRIDACEAE	<i>Watsonia laccata</i> (Jacq.) Ker Gawl.	LC
JUNCACEAE	<i>Juncus acutus</i> L. subsp. <i>leopoldii</i> (Parl.) Snogerup	LC
JUNCACEAE	<i>Juncus capensis</i> Thunb.	LC
JUNCACEAE	<i>Juncus dregeanus</i> Kunth subsp. <i>dregeanus</i>	LC
LAMIACEAE	<i>Stachys graciliflora</i> C.Presl	LC

LAURACEAE	* <i>Cassytha filiformis</i> L.	Not Evaluated
LOBELIACEAE	<i>Lobelia coronopifolia</i> L.	LC
LOBELIACEAE	<i>Lobelia erinus</i> L.	LC
LOBELIACEAE	<i>Monopsis unidentata</i> (Dryand.) E.Wimm. subsp. <i>unidentata</i>	LC
MALVACEAE	<i>Anisodonteia scabrosa</i> (L.) Bates	LC
MALVACEAE	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC
MALVACEAE	<i>Hermannia althaeifolia</i> L.	LC
MALVACEAE	<i>Hermannia angularis</i> Jacq.	LC
MALVACEAE	<i>Hermannia holosericea</i> Jacq.	LC
MALVACEAE	<i>Hermannia lavandulifolia</i> L.	LC
MALVACEAE	<i>Hermannia salviifolia</i> L.f. var. <i>salviifolia</i>	LC
MALVACEAE	<i>Hermannia velutina</i> DC.	LC
MALVACEAE	<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	LC
MESEMBRYANTHEMACEAE	<i>Aptenia lancifolia</i> L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Carpobrotus deliciosus</i> (L.Bolus) L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Carpobrotus edulis</i> (L.) L.Bolus subsp. <i>edulis</i>	LC
MESEMBRYANTHEMACEAE	<i>Cephalophyllum diversiphyllum</i> (Haw.) H.E.K.Hartmann	NT
MESEMBRYANTHEMACEAE	<i>Delosperma multiflorum</i> L.Bolus	LC
MESEMBRYANTHEMACEAE	<i>Drosanthemum brevifolium</i> (Aiton) Schwantes	LC
MESEMBRYANTHEMACEAE	<i>Lampranthus conspicuus</i> (Haw.) N.E.Br.	DDT
MESEMBRYANTHEMACEAE	<i>Lampranthus dependens</i> (L.Bolus) L.Bolus	DDT
MESEMBRYANTHEMACEAE	<i>Lampranthus sociorum</i> (L.Bolus) N.E.Br.	VU
MESEMBRYANTHEMACEAE	<i>Lampranthus stayneri</i> (L.Bolus) N.E.Br.	LC
MESEMBRYANTHEMACEAE	<i>Lampranthus stipulaceus</i> (L.) N.E.Br.	LC
MESEMBRYANTHEMACEAE	<i>Mesembryanthemum aitonis</i> Jacq.	LC
MYRTACEAE	* <i>Leptospermum laevigatum</i> (Gaertn.) F.Muell.	Not Evaluated
NEPHROLEPIDACEAE	* <i>Nephrolepis exaltata</i> (L.) Schott	Not Evaluated
OLEACEAE	<i>Olea exasperata</i> Jacq.	LC
ORCHIDACEAE	<i>Ceratandra grandiflora</i> Lindl.	LC
ORCHIDACEAE	<i>Disa hians</i> (L.f.) Spreng.	LC
ORCHIDACEAE	<i>Disa sagittalis</i> (L.f.) Sw.	LC
ORCHIDACEAE	<i>Disperis capensis</i> (L.f.) Sw. var. <i>capensis</i>	LC
ORCHIDACEAE	<i>Holothrix burchellii</i> (Lindl.) Rchb.f.	LC
ORCHIDACEAE	<i>Holothrix parviflora</i> (Lindl.) Rchb.f.	LC
ORCHIDACEAE	<i>Satyrium outeniquense</i> Schltr.	LC
ORCHIDACEAE	<i>Satyrium rupestre</i> Schltr. ex Bolus	LC
ORCHIDACEAE	<i>Satyrium stenopetalum</i> Lindl. subsp. <i>stenopetalum</i>	LC
OROBANCHACEAE	<i>Cycnium tubulosum</i> (L.f.) Engl. subsp. <i>tubulosum</i>	LC
OROBANCHACEAE	<i>Graderia scabra</i> (L.f.) Benth.	LC
OXALIDACEAE	<i>Oxalis polyphylla</i> Jacq. var. <i>polyphylla</i>	LC
PARMELIACEAE	<i>Parmotrema reticulatum</i> (Taylor) M.Choisy	
PARMELIACEAE	<i>Usnea rubicunda</i> Stirt.	
PHYLLANTHACEAE	<i>Lachnostylis hirta</i> (L.f.) Müll.Arg.	LC
PLANTAGINACEAE	<i>Plantago crassifolia</i> Forssk. var. <i>crassifolia</i>	LC
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	LC
PLUMBAGINACEAE	<i>Limonium scabrum</i> (Thunb.) Kuntze var. <i>scabrum</i>	LC
POACEAE	<i>Cynodon dactylon</i> (L.) Pers.	LC

POACEAE	<i>Ehrharta calycina</i> Sm.	LC
POACEAE	<i>Ehrharta capensis</i> Thunb.	LC
POACEAE	<i>Eragrostis capensis</i> (Thunb.) Trin.	LC
POACEAE	<i>Eragrostis plana</i> Nees	LC
POACEAE	<i>Heteropogon contortus</i> (L.) Roem. & Schult.	LC
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	LC
POACEAE	* <i>Lolium perenne</i> L.	Not Evaluated
POACEAE	* <i>Paspalum dilatatum</i> Poir.	Not Evaluated
POACEAE	<i>Paspalum distichum</i> L.	LC
POACEAE	<i>Pennisetum thunbergii</i> Kunth	LC
POACEAE	* <i>Polypogon viridis</i> (Gouan) Breistr.	Not Evaluated
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC
POACEAE	<i>Themeda triandra</i> Forssk.	LC
POACEAE	<i>Tribolium uniola</i> (L.f.) Renvoize	LC
POLYGALACEAE	<i>Muraltia ericoides</i> (Burm.f.) Steud.	LC
POLYGALACEAE	<i>Polygala bracteolata</i> L.	LC
POLYGALACEAE	<i>Polygala fruticosa</i> P.J.Bergius	LC
POLYGALACEAE	<i>Polygala levynsiana</i> Paiva	LC
POLYGALACEAE	<i>Polygala myrtifolia</i> L. var. <i>myrtifolia</i>	LC
POLYGALACEAE	<i>Polygala umbellata</i> L.	LC
POLYGONACEAE	<i>Persicaria attenuata</i> (R.Br.) Soják subsp. <i>africana</i> K.L.Wilson	LC
PONTEDERIACEAE	* <i>Eichhornia crassipes</i> (Mart.) Solms	Not Evaluated
POTTIACEAE	<i>Tortella xanthocarpa</i> (Schimp. ex Müll.Hal.) Broth.	
POTTIACEAE	<i>Trichostomum brachydontium</i> Bruch	
PRIMULACEAE	* <i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	Not Evaluated
PROTEACEAE	* <i>Hakea sericea</i> Schrad. & J.C.Wendl.	Not Evaluated
PROTEACEAE	<i>Leucadendron salignum</i> P.J.Bergius	LC
PROTEACEAE	<i>Leucospermum formosum</i> (Andrews) Sweet	EN
PROTEACEAE	<i>Protea mundii</i> Klotzsch	LC
PROTEACEAE	<i>Protea neriifolia</i> R.Br.	LC
PROTEACEAE	<i>Protea speciosa</i> (L.) L.	LC
PTERIDACEAE	<i>Adiantum capillus-veneris</i> L.	LC
PTERIDACEAE	* <i>Pteris tremula</i> R.Br.	Not Evaluated
RESTIONACEAE	<i>Elegia equisetacea</i> Mast.	LC
RESTIONACEAE	<i>Hypodiscus willdenowia</i> (Nees) Mast.	LC
RESTIONACEAE	<i>Restio albotuberculatus</i> H.P.Linder & C.R.Hardy	LC
RESTIONACEAE	<i>Restio triticeus</i> Rottb.	LC
RESTIONACEAE	<i>Thamnochortus cinereus</i> H.P.Linder	LC
RESTIONACEAE	<i>Thamnochortus glaber</i> (Mast.) Pillans	LC
RHAMNACEAE	<i>Phylica axillaris</i> Lam. var. <i>axillaris</i>	LC
RHAMNACEAE	<i>Phylica axillaris</i> Lam. var. <i>maritima</i> Pillans	LC
RHAMNACEAE	<i>Phylica confusa</i> Pillans	LC
RHAMNACEAE	<i>Phylica propinqua</i> Sond.	LC

RHAMNACEAE	<i>Phylla rubra</i> Willd. ex Roem. & Schult.	LC
RHAMNACEAE	<i>Scutia myrtina</i> (Burm.f.) Kurz	LC
ROCELLACEAE	<i>Opegrapha loandensis</i> Nyl.	
ROSACEAE	<i>Cliffortia falcata</i> L.f.	LC
ROSACEAE	<i>Cliffortia linearifolia</i> Eckl. & Zeyh.	LC
ROSACEAE	<i>Cliffortia serpyllifolia</i> Cham. & Schldl.	LC
RUBIACEAE	<i>Anthospermum aethiopicum</i> L.	LC
RUBIACEAE	<i>Anthospermum prostratum</i> Sond.	LC
RUTACEAE	<i>Agathosma apiculata</i> G.Mey.	LC
RUTACEAE	<i>Agathosma capensis</i> (L.) Dummer	LC
RUTACEAE	<i>Agathosma elegans</i> Cham.	LC
RUTACEAE	<i>Agathosma ovata</i> (Thunb.) Pillans	LC
RUTACEAE	<i>Euchaetis burchellii</i> Dummer	LC
SANTALACEAE	<i>Osyris compressa</i> (P.J.Bergius) A.DC.	LC
SANTALACEAE	<i>Thesium lisae-mariae</i> Stauffer	DDT
SANTALACEAE	<i>Thesium sertulariastrum</i> A.W.Hill	DDT
SANTALACEAE	<i>Thesium virgatum</i> Lam.	LC
SAPOTACEAE	<i>Sideroxylon inerme</i> L. subsp. <i>inerme</i>	LC
SCHIZAEACEAE	<i>Schizaea pectinata</i> (L.) Sw.	LC
SCROPHULARIACEAE	<i>Chaenostoma caeruleum</i> (L.f.) Kornhall	LC
SCROPHULARIACEAE	<i>Chaenostoma integrifolium</i> (L.f.) Benth.	LC
SCROPHULARIACEAE	<i>Jamesbrittenia tenuifolia</i> (Bernh.) Hilliard	LC
SCROPHULARIACEAE	<i>Phyllopodium rustii</i> (Rolfe) Hilliard	LC
SCROPHULARIACEAE	<i>Selago glomerata</i> Thunb.	LC
SINOPTERIDACEAE	<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	LC
SOLANACEAE	<i>Solanum rigescens</i> Jacq.	Not Evaluated
TELOSCHISTACEAE	<i>Teloschistes flavicans</i> (Sw.) Norman var. <i>flavicans</i>	
THYMELAEACEAE	<i>Lachnaea diosmoides</i> Meisn.	LC
THYMELAEACEAE	<i>Passerina corymbosa</i> Eckl. ex C.H.Wright	LC
THYMELAEACEAE	<i>Passerina montivaga</i> C.L.Bredenkamp & A.E.van Wyk	LC
THYMELAEACEAE	<i>Struthiola parviflora</i> Bartl. ex Meisn.	LC
THYMELAEACEAE	<i>Struthiola striata</i> Lam.	LC
VERBENACEAE	* <i>Verbena bonariensis</i> L.	Not Evaluated
ZYGOPHYLLACEAE	<i>Zygophyllum morgsana</i> L.	LC