

APPENDIX F1
BOTANICAL ASSESSMENT

Botanical Impact Assessment
for the upgrade of the
N1 Section 4, near Matjiesfontein
in the Laingsburg Local Municipality.

This report was prepared during April 2018 by:

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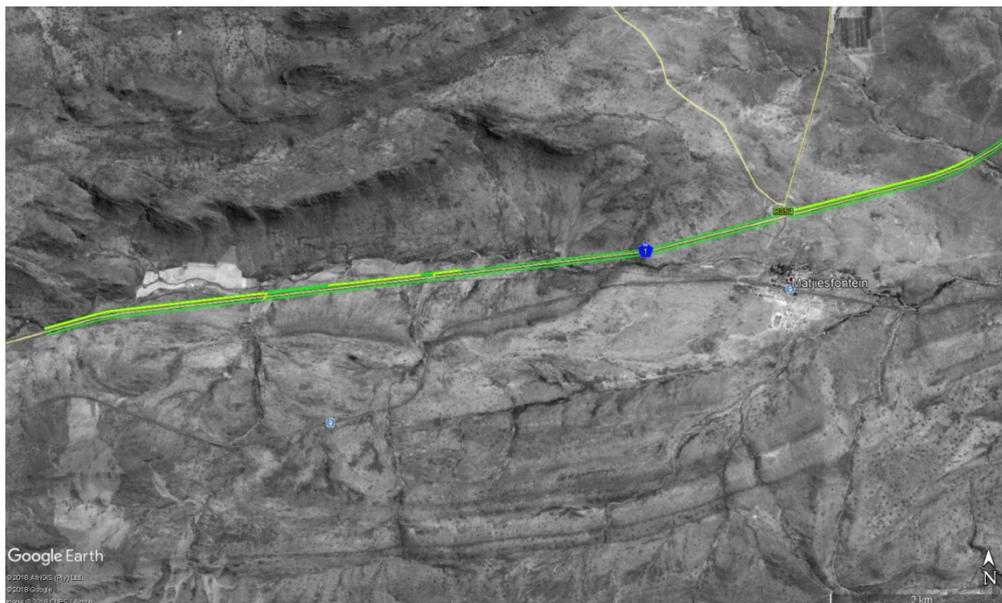
INTRODUCTION

It is proposed that a section of approximately 17 km of the national road located between Touwsrivier and Laingsburg, in the vicinity of Matjiesfontein (46.0 km – 63.0 km of the N1) would be upgraded (see Map 1). The proposed road upgrade would consist of;

1. Widening the surfaced width of the road from 10.8 m to approximately 17 m in order to accommodate three lanes of traffic with an alternating configuration of two lanes in one direction and one lane in the other.
2. Widening of the existing road reserve, which currently varies between 30 – 40 m along this section, to approximately 60 m.
3. Upgrading of the Matjiesfontein-Sutherland intersection. An area of about 4 ha will be disturbed at the intersection.
4. Closure of single property access points and the relocation of existing services located within the road reserve.

It can thus be assumed that the natural vegetation will be disturbed during the upgrading of the N1 in the following areas:

1. A strip of about 30 m wide on either side of the existing road reserve along the entire section that will be upgraded; and
2. An area of about 4 ha in extent at the Matjiesfontein intersection.



Map 1: The section of the N1 that will be upgraded.

The terms of reference for this study is to comply with:

1. Appendix 6 of the 2014 National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations (and as amended), detailing the requirements for specialist's reports.
2. The principals outlined in the *Guideline for Biodiversity Specialists* (WC: DEA&DP, 2005) and those of the *Western Cape Biodiversity Spatial Plan Handbook* (Pool-Stanvliet et al, 2017).

Jan Vlok of RES surveyed all the affected areas during March and April 2018 and the results of my field studies are provided here. My declaration of independence is provided as Appendix 1, my impact assessment in Appendix 2 and my CV as Appendix 3.

METHODOLOGY AND UNCERTAINTY REGARDING STUDY RESULTS

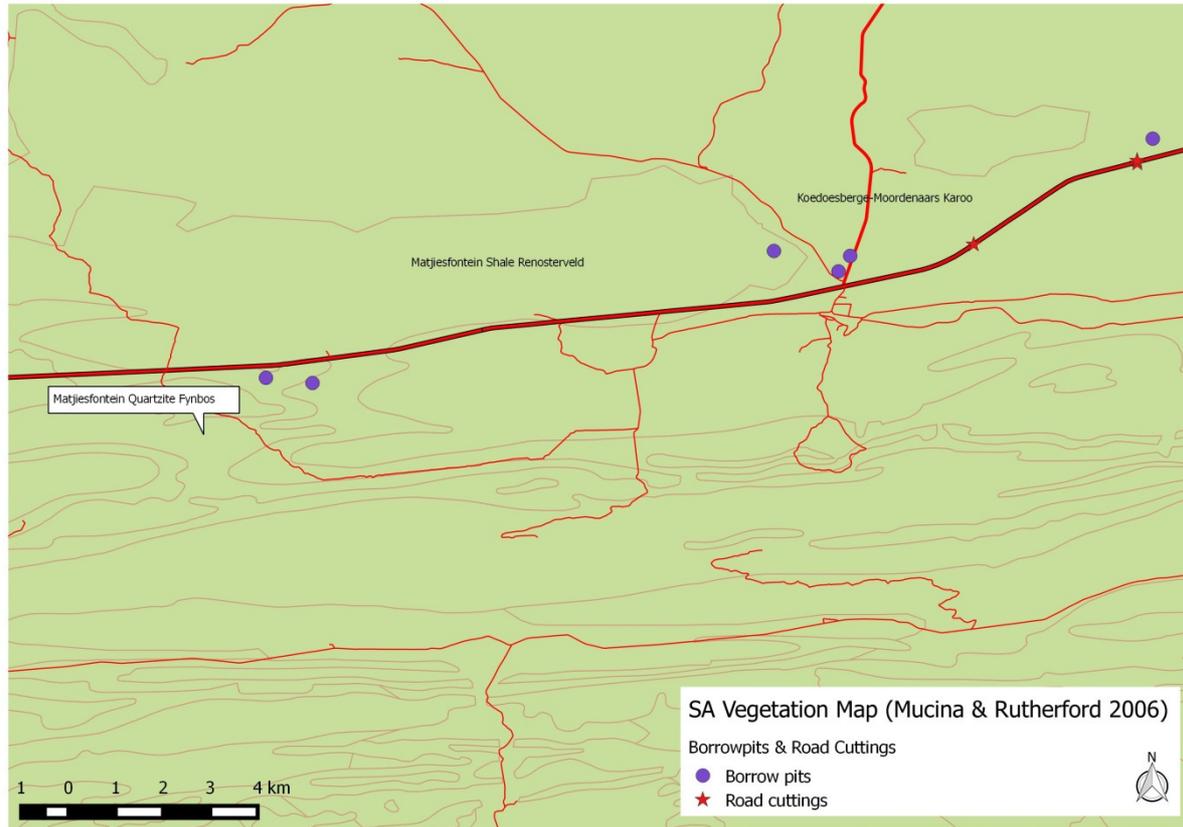
The national status of the affected vegetation type was determined by means of consulting Mucina *et al* (2006) and the regional significance of the affected vegetation was determined by means of consulting the fine-scale conservation plan developed for the region, as prepared by Pence (2017).

All the proposed development areas were surveyed to determine the ecological condition of the local vegetation and to establish if any rare or endangered plant species (*sensu* Raimondo *et al*, 2009 and updates thereof in www.sanbi/redlist) are, or may be present. The field survey was conducted during autumn in a very dry year (2018). This is not ideal as surveys in karroid vegetation should be done after good rain, but rainfall is highly unpredictable in the affected area and the survey could not be timed to coincide with rainfall. All the areas where undisturbed natural vegetation is still present was surveyed on foot and an effort was made to look for evidence (dried stems and inflorescences) of rare or localized species that are only present after good rain (e.g. *Geissorhiza karooica*, *Pelargonium githagineum*, etc.). Remnants of species that respond to rain and that flower only in spring, e.g. *Moraea polystachya*, were found and I am confident that the species lists that were compiled for the affected sites are at least 70% complete and that no threatened species were missed due to the drought at the time of the survey.

My findings and recommendations will hence comply with the guidelines provided in the *Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape* (2nd edition, 2016), the *Guideline for Biodiversity Specialists* (DEA&DP, 2005) and those of the *Western Cape Biodiversity Spatial Plan Handbook* (Pool-Stanvliet et al, 2017).

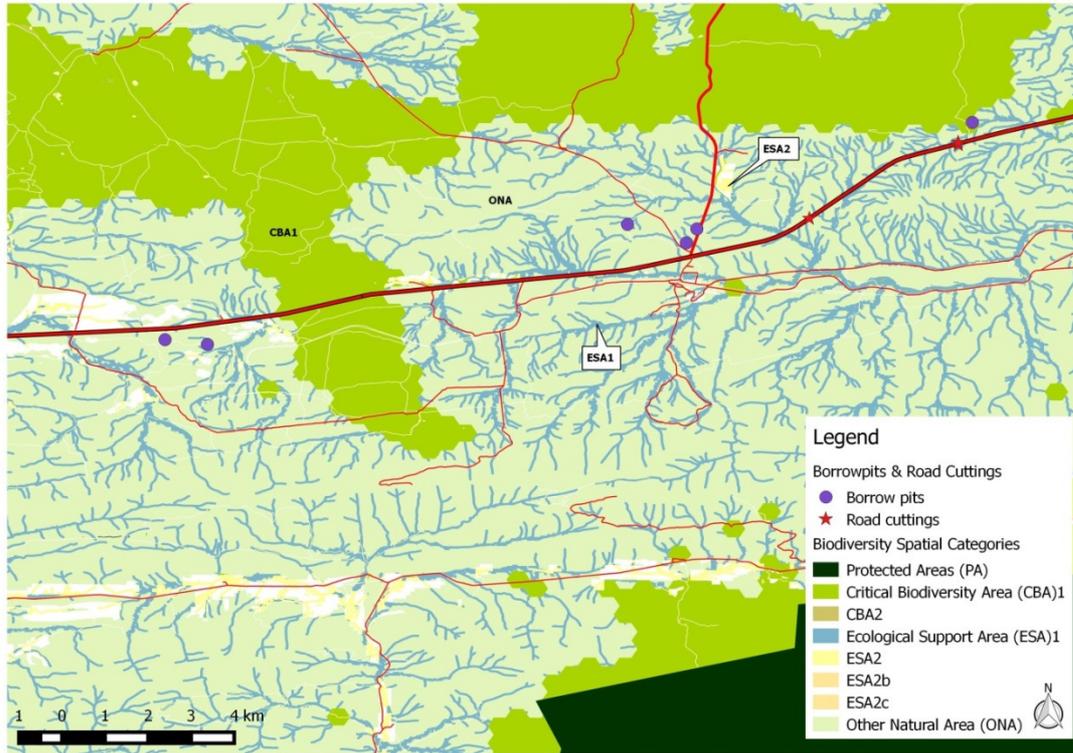
STUDY RESULTS

Following the national vegetation classification the section of the N1 that would be upgraded intersects two vegetation types; Matjiesfontein Shale Renosterveld and Koedoesberg-Moordenaars Karoo, both of which have a status of Least Concerned (see Map 1).



Map 1. National vegetation types that occur in the section of the N1 that will be upgraded with location of the two cutting sites indicated with a red star.

The regional conservation plan shows that the western part of the proposed project area intersects a Critical Biodiversity Area (CBA1) and that several Ecological Support Areas (ESA) occur where water drainage areas are intersected (see Map 2).



Map 2: Regional conservation plan for the section of the N1 that would be upgraded with location of the two cutting sites indicated with a red star.



Photo 1: In the foreground is an example of disturbed vegetation within the road reserve along the section of the N1 that would be upgraded. The common yellow shrub is Kraalbos (*Galenia africana*). When abundant, this pioneer species is indicative of recent disturbance.

The natural vegetation that occurs in the southern road reserve was heavily disturbed along the entire section of the N1 that will be upgraded (see Photo 1). The disturbance was presumably caused when a new optic fiber line was installed relatively recently along the southern side of the N1. Only early and secondary pioneer species were found along this southern road reserve, with the following species most abundant;

Shrubs and herbs: *Anisodonteia anomala*, *Drosanthemum archeri*, *D. hispidum*, *Felicia muricata*, *Galenia africana*, *Gazania krebsiana*, *G. lichtensteinii*, *Helichrysum dregeanum*, *H. leontonyx*, *H. zeyheri*, *Hermannia althaeifolia*, *Mesembryanthemum articulatum*, *M. junceum*, *M. stenandrum*, *Otholobium arborescens*, *Pelargonium grossularioides*, *P. minimum* and *Ruschia multiflora*.

Grasses: *Agrostis lachnantha*, *Enneapogon desvauxii*, *E. scaber*, *Eragrostis curvula*, *Fingerhuthia africana*, *Melinus repens* and *Tribolium acutiflorum*.

Some sections of the road reserve on the northern side of the N1 is also highly disturbed with the same subset of pioneer species present that occurs south of the road. There are, however, other sections of the northern road reserve where the natural vegetation is only moderately disturbed. West of Matjiesfontein the northern road reserve vegetation consists of a mix of Renosterveld and Succulent Karoo vegetation (Matjiesfontein Shale Renosterveld and Koedoesberg-Moordenaars Karoo) and at the Matjiesfontein intersection and east thereof the vegetation consists only of Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo).

The species present in the **Renosterveld** in the areas that would be affected (within road reserve and within the 50 m wide strip that may be developed) are as follows:

Trees and tall shrubs: *Diospyros lycioides*, *Otholobium arborescens*, *Searcea glauca* and *S. lancea*.

Shrubs and Herbs: *Amphiglossa tomentosa*, *Anisodonteia anomala*, *Anthospermum aethiopicum*, *Arctotheca prostrata*, *Arctotis acaulis*, *Aspalathus spinosa*, *Berkheya heterophylla*, *Chrysocoma tenuifolia*, *Dianthus thunbergii*, *Dimorphotheca cuneata*, *Elytropappus rhinocerotis*, *Eriocephalus brevifolius*, *E. ericoides*, *Euryops lateriflorus*, *E. subcarnosus*, *Felicia filifolia*, *Galenia africana*, *Gazania krebsiana*, *Gnidia deserticola*, *Helichrysum hamulosum*, *H. dregeanum*, *Hermannia althaeifolia*, *H. cuneifolia*, *H. flammea*,

Lobostemon echioides, *Nenax microphylla*, *Oedera genistifolia*, *O. squarrosa*, *Othonna arbuscula*, *Pelargonium glutinosum*, *P. karooicum*, *P. minimum*, *P. myrrhifolium*, *P. trifidum*, *Pentzia incana*, *Pteronia flexicaulis*, *P. incana*, *P. paniculata*, *Relhania relhanoioides* and *Tetragonia fruticosa*.

Succulents: *Adromischus liebenbergii*, *Antimima pygmaea*, *Cephalophyllum curtophyllum*, *Cheiridopsis cigaretifera*, *Cleretum papulosum*, *Crassula alpestris*, *C. capitella*, *C. cotyledonis*, *C. hemisphaerica*, *C. muscosa*, *C. rupestris*, *C. subaphylla*, *C. tetragona*, *Drosantheum archeri*, *D. hispidum*, *D. tuberculiferum*, *Euphorbia mauritanica*, *E. rhombifolia*, *Pelargonium crithmifolium*, *P. stipulaceum*, *Ruschia cradockensis*, *R. crassa*, *R. multiflora*, *R. pungens*, *Senecio radicans*, *Tylecodon reticulata* and *T. wallichii*,

Graminoids: *Aristida diffusa*, *A. congesta*, *Cenchrus ciliaris*, *Cyperus marginatus*, *Ehrharta villosa*, *Enneapogon scaber*, *Eragrostis curvula*, *Pentameris airoides*, *P. pallida*, *P. eriostoma*, *Phragmites australis*, *Scirpoides dioecus*, *Sporobolus fimbriatus* and *Tribolium hispidum*.

Geophytes: *Chamarea capensis*, *Cyphia digitata*, *Eriospermum capense*, *Moraea lewisiae*, *M. miniata*, *M. polystachya*, *Oxalis pes-caprae* and *O. purpurea*.

Rare and Threatened species in affected Renosterveld vegetation: No threatened species were found in the proposed development areas and none are expected to occur here, even after good rain.

The species present in the **Succulent Karoo** vegetation in the areas that would be affected (within current road reserve and beyond in 50 m wide strip that may be disturbed) are as follows:

Trees and tall shrubs: *Diospyros lycioides*, *Searcea glauca* and *S. lancea*.

Shrubs and Herbs: *Aptosimum spinescens*, *Berkheya spinosa*, *Chrysocoma tenuifolia*, *Dianthus thunbergii*, *Elytropappus rhinocerotis*, *Eriocephalus ericoides*, *E. decussatus*, *Euryops lateriflorus*, *Felicia filifolia*, *F. muricata*, *Galenia africana*, *G. fruticosa*, *G. sarcophylla*, *Garuleum bipinnatum*, *Gazania krebsiana*, *G. lichtensteinii*, *Helichrysum dregeanum*, *H. rosum*, *Hermannia althaeifolia*, *H. cuneifolia*, *Hirpicium integrifolium*, *Lycium cinereum*, *Manochlamys albicans*, *Melolobium exudans*, *Osteospermum sinuatum*, *Pegolettia retrofracta*, *Pentzia incana*, *Pteronia empetrifolia*, *P. flexicaulis*, *P. glauca*, *P.*

incana, *P. pallens*, *P. paniculata*, *P. succulenta*, *P. viscosa*, *Rosenia humilis*, *R. oppositifolia*, *Salsola aphylla*, *Tetragonia fruticosa*, *Thesium lineatum*, *Ursinea pilifera* and *Zygophyllum microcarpum*.

Succulents: *Adromischus maculatus*, *Aloe variegata*, *Antimima hallii*, *A. pygmaea*, *A. wittebergensis*, *Astroloba robusta*, *Bulbine frutescens*, *Cephalophyllum curtophyllum*, *Cheiridopsis cigaretifera*, *Crassula capitella*, *C. cotyledonis*, *C. muscosa*, *C. pyramidalis*, *C. subaphylla*, *C. tetragona*, *Drosanthemum tuberculiferum*, *Euphorbia decussata*, *E. multiceps*, *E. stolonifera*, *Haworthia arachnoidea*, *Hereroa aspera*, *Kleinia longiflora*, *Mesembryanthemum junceum*, *M. noctiflorum*, *M. splendens*, *M. vaginatum*, *Othonna arbuscula*, *Pachypodium bispinosum*, *Pelargonium crithmifolium*, *Ruschia cradockensis*, *R. crassa*, *R. karooica*, *R. pungens* and *Tylecodon reticulata*.

Graminoids: *Aristida diffusa*, *A. congesta*, *Fingerhuthia africana* and *Stipagrostis obtusa*.

Geophytes: *Moraea polystachya* and *Oxalis pes-caprae*.

Rare and Threatened species in affected Succulent Karoo vegetation: No rare or threatened species were found in the proposed development areas and none are expected to occur here, even after good rain.

The Succulent Karoo vegetation that occurs in the ca. 4 ha area that would be affected at the Matjiesfontein intersection is highly disturbed (see Photo 2) and of little conservation value.



Photo 2: Disturbed Succulent Karoo vegetation at Matjiesfontein intersection.

The Succulent Karoo vegetation at the two cutting sites that are located in the northern road reserve is only partially disturbed (see Photo 3), but those at the cutting site that is located in the southern road reserve is highly disturbed. A striking difference between the northern road reserve vegetation and those on the other side of the fence is the presence and relative abundance of palatable species (e.g. *Berkheya spinosa*, *Galium fruticosum*, *Osteospermum sinuatum*, *Hirpicium integrifolium*, *Ursinea pilifera*, etc.) in the road reserve. This clearly indicates to what extent the Succulent Karoo vegetation has been overgrazed in the camps next to the road. In all the sections where disturbance would extend beyond the current road reserve, the vegetation was further disturbed by farm tracks that run next to the road reserve fence (see Photo's 1 & 4).



Photo 3: Example of Succulent Karoo vegetation in the northern road reserve at one of the cutting sites. Highly palatable species only occur in such moderately transformed Succulent Karoo vegetation within the road reserve.

The Renosterveld and Succulent Karoo vegetation that will be affected in the area where a CBA is intersected is highly disturbed (see Photo 4). Here a farm road runs parallel to the

road reserve, the vegetation is transformed through severe grazing pressure and parts of the area consist of old agricultural lands. The only sensitive vegetation in this section is the riverine vegetation that occurs north of the N1 (see Photo 4).



Photo 4: Severely disturbed vegetation next to road reserve in the area where the CBA is intersected. The riverine vegetation (clearly indicated by the band of light colored Fluitjiesriet [*Phragmites australis*]) that occurs north of the telephone poles is the only highly sensitive vegetation that occurs within the proposed upgrading area that falls within the CBA.

See Appendix 2 for impact assessment of proposed activities, with and without mitigation actions.

CONCLUSIONS AND RECOMMENDATIONS

The proposed upgrading areas of the N1 intersect only one highly sensitive area. This site is located within the CBA, where riverine vegetation occurs along a water drainage line that runs north of, and parallel to, the N1 over a distance of about 500 m (see Maps 3 & 4). The terrestrial vegetation between the water drainage line and the N1 in this section is highly disturbed (see Photo 4).



Map 4: The sensitive vegetation within the intersected CBA where the proposed road upgrade may affect the riverine vegetation over an area of about 500 m in length is marked with a red block.

With the exception of the sensitive site indicated on Map 4, none of the other proposed upgrade areas occur within natural vegetation that is of particular significance to conservation. The affected vegetation types are not threatened vegetation types and no rare or threatened plant species were found (or are expected) to occur in any of the proposed areas of disturbance. The loss of the disturbed strip of terrestrial vegetation in the intersected CBA will not severely affect any important ecological process, on condition that the adjacent riverine vegetation is not disturbed.

Several additional working areas will be required during the construction phase to park vehicles, to be used as stockpile areas, etc. The location of these operational sites has not been determined yet. The potential impact of these operational sites has thus not been determined yet and they should not be located in undisturbed vegetation.

Very few of the species that occur in the areas that would be disturbed can be replanted with a reasonable degree of success. I hence do not propose any 'search and rescue' operation for species such as succulent plants as their survival rate will be very low. I do however recommend that, wherever possible, the topsoil is retained and used to improve natural revegetation after the construction phase.

The proposed mitigation actions proposed to limit the impact on natural vegetation is as follows:

1. Ensure that the sensitive riverine vegetation in the area indicated on Map 4 is not disturbed or negatively affected by the proposed upgrade of the N1. This may require the realignment of the road to establish a 3rd lane in this section.
2. Ensure that all the yet to be determined operational sites are located in disturbed vegetation. This will require an impact assessment of the affected vegetation in the proposed operation sites before any of the areas are cleared.
3. Wherever possible (thus excluding rocky outcrops), remove the upper 100 mm of topsoil (along with the current vegetation) before any area is cleared and store the topsoil in berms that are not wider, or taller than 2 m. This topsoil must be replaced to a depth of 100 mm in disturbed areas at the end of the construction phase.

REFERENCES

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Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C.,

Kamundi, D.A. & Manyama, P.A., 2009. Red List of South African plants.

Strelitzia 25, SANBI, Pretoria.

Pence, G.Q.K., 2017. Western Cape Biodiversity Framework 2017. Status Update: Critical Biodiversity Areas of the Western Cape. Unpublished CapeNature report.

Pool-Stanvliet, R., Duffel-Canham, A., Pence, G. & Smart, R. 2017. Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch, CapeNature.

Appendix 1:

Appendix 2: Impact assessment for the proposed upgrading of the N1. This assessment considers the cumulative impacts of all the areas that will be disturbed to upgrade the N1, but excludes sites that may be not yet identified where natural vegetation will be cleared during the operational phase.

Without proposed mitigation actions

| Impact description | Extent | Intensity | Duration | Probability | Confidence | Reversibility | Significance |
|--------------------------------|--------|-----------|-----------|-------------|------------|---------------|--------------|
| Loss of sensitive vegetation. | Local | Medium | Long term | Definite | Certain | Irreversible | Medium |
| Damage to riverine vegetation. | Local | Medium | Long term | Probable | Sure | Irreversible | Medium |

With proposed mitigation actions

| Impact description | Extent | Intensity | Duration | Probability | Confidence | Reversibility | Significance |
|--------------------------------|--------|-----------|------------|-------------|------------|---------------|--------------|
| Loss of sensitive vegetation. | Local | Low | Long term | Definite | Certain | Reversible | Low |
| Damage to riverine vegetation. | Local | Low | Short term | Probable | Sure | Reversible | Low |

The Proposed mitigation measures are follows:

1. Ensure that the sensitive riverine vegetation in the area indicated on Map 4 is not disturbed or negatively affected by the proposed upgrading of the N1. This may require the realignment of the road to establish a 3rd lane in this section.
2. Ensure that all operational sites are not located in sensitive vegetation. This will require an impact assessment of the affected vegetation in the proposed operation sites before any area is cleared.
3. Wherever possible (thus excluding rocky outcrops), remove the top 100 mm of topsoil before any area is cleared and store the topsoil in berms that are not wider, or taller than 2 m. This topsoil can be replaced in disturbed areas after the construction phase to a depth of 100 mm.

Appendix 3: CV of botanist who conducted the survey and prepared the report.

CURRICULUM VITAE

Johannes Hendrik Jacobus Vlok

Biographical Information

Birth: 6th December 1957, Calvinia, South Africa.

Identity Number: 571206 5133 089

Criminal Record: None.

Married to Anne Lise Schutte-Vlok and we have one daughter, Marianne Helena Vlok.

Education

1975 Matriculated at Bellville High School.

1982 Diploma in Forestry, Saasveld Forestry College.

1997 MSc (*Cum Laude*), University of Natal.

Employment

1982-1990. Department of Forestry (later Water Affairs, Forestry and Environmental Affairs), as research technician.

1990-1997. Cape Nature Conservation, as regional botanist.

1997-present. Self employed as environmental advisor (Regalis Environmental Services).

Research Output

One book and more than 30 scientific and popular articles published in international & national journals as primary or as co-author. Delivered three keynote and >20 other verbal papers at scientific forums on ecological and floristic studies. Delivered >300 presentations to civil society in public meetings and *via* other media (radio, newspaper and television) on plant ecology and conservation. Current ResearchGate rating = 24.9 with > 1 100 citations of my papers.

Awards

2003. Leslie Hill medal. **Succulent Society of South Africa.**

2006. Gold award. **C.A.P.E.**

2006. Certificate of Appreciation. **Western Cape Conservation Stewardship Association.**

2008. Special Award. **CapeNature**

2010. Marloth medal. **Botanical Society of South Africa.**

Consultation & Advisory Capacity

Consultant to WWF-SA, Cape Nature and SANPARKS to determine conservation status of land. Several of the studies resulted in the purchase of the properties, now amounting to a value of >R50 million.

Consultant to National, Provincial and private institutions for vegetation restoration projects, environmental impact assessment and environmental management plans. Some of these assignments won national awards.

Referee for international and national scientific articles and donor funded grants.

Classified, described and mapped Forest, Subtropical Thicket, Fynbos and Succulent Karoo vegetation units in four major donor funded projects.

Expert witness in Magistrate and Supreme Court cases.

Research associate and subject moderator for NMMU (Saasveld campus).