APPENDIX 3.1: BOTANICAL ASSESSMENT

Revised Botanical Impact Assessment

for proposed borrow pits and quarry sites

for the upgrade of the N1 Section 4

between Matjiesfontein and Laingsburg.

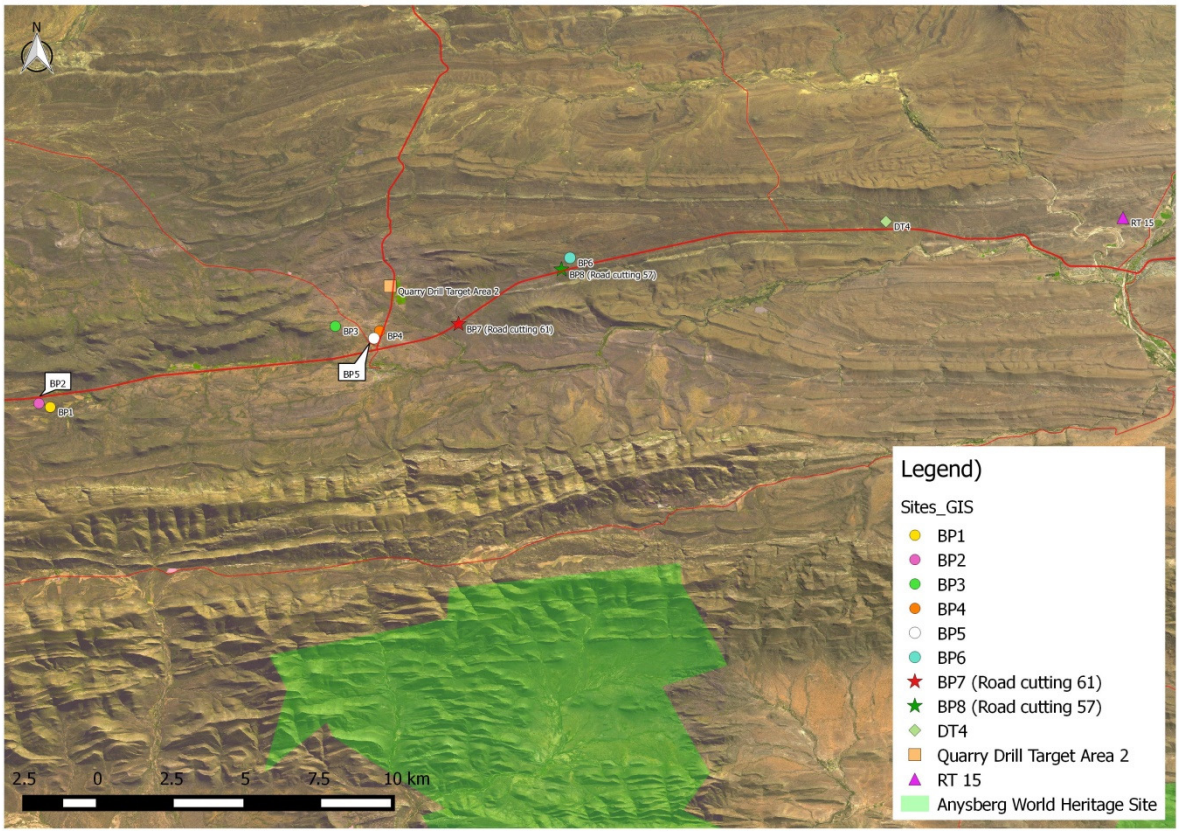
This report was prepared during November 2019 by:

Regalis Environmental Services CC
P.O. Box 1512
6620 Oudtshoorn
Tel: 044-2791987
Email: janvlok@mweb.co.za

INTRODUCTION

A 17 km stretch of the N1 Section 4, in the vicinity of Matjiesfontein in the Laingsburg Local Municipality, must be upgraded to increase the capacity of the road. In order to obtain suitable road-construction materials for the proposed upgrade new borrow pits and/or quarries must be established.

Eleven sites have been identified as a source for the required material. The purpose of this report is to provide a botanical impact assessment report for the eleven potential borrow sites. The exact extent to which material will be removed from each site is not yet known, but it is anticipated that the vegetation would not be disturbed beyond a radius of 150 m from the center point of the site (thus an area of about 7 ha at each site). The locations of the proposed sites are indicated on Map 1.



Map 1: The location of the proposed 11 borrow pit and quarry sites.

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 an area of about 10 ha at each of the sites during March 2018 and November 2019 and the results of my field study are provided here. My declaration of independence is provided as Appendix 1, my impact assessment in Appendix 2 and my CV as Appendix 3.

Please note that this report replaces an earlier report (dated February 2019) as some sites were withdrawn since the material at these sites were found not to be suitable, while some new sites are proposed to replace the withdrawn sites.

METHODOLOGY AND UNCERTAINTY REGARDING STUDY RESULTS

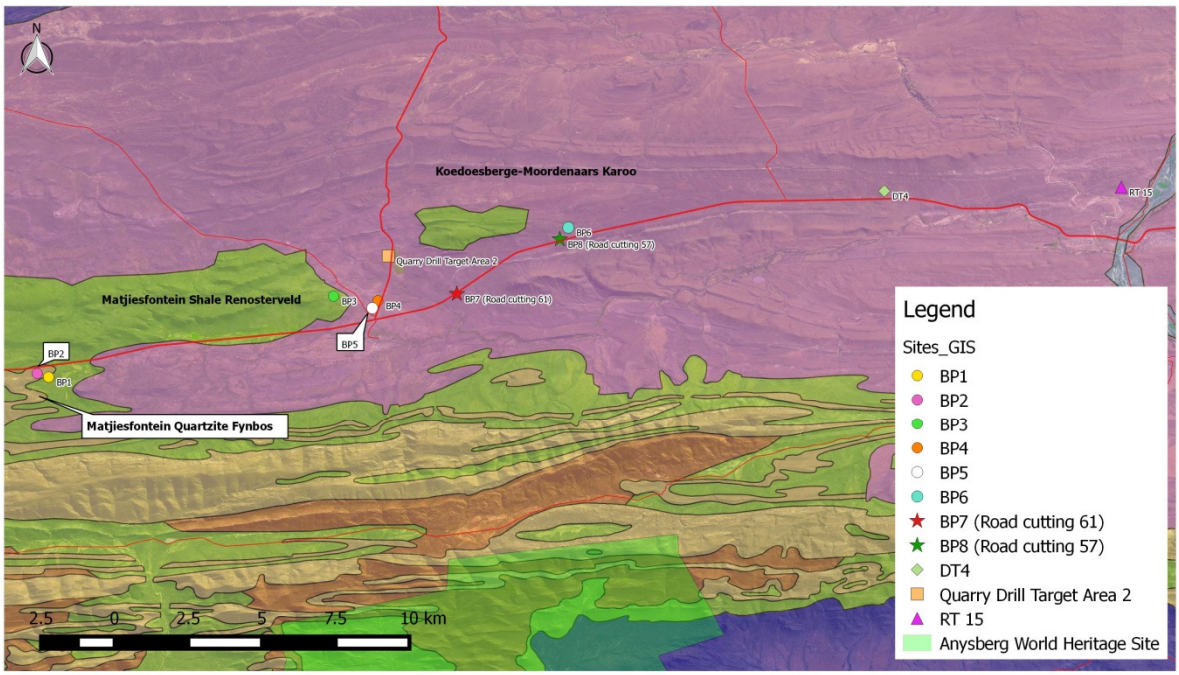
The national status of the affected vegetation type was determined by means of consulting Mucina *et al (*2006) and the regional significance of the affected vegetation was determined by means of consulting the fine-scale conservation plan for the region, as was adjustments by Pence (2017).

The proposed development sites were surveyed on foot 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 in the proposed development area. The field survey was conducted during autumn in a very dry year. This is not ideal as surveys 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. Two of the sites (Renosterveld) were partially burned, which facilitated determining the presence of fire ephemerals, but both areas were heavily grazed by domestic livestock. The livestock may have removed some of the fire ephemerals. The other sites have non-flammable vegetation (Succulent Karoo). A specific effort was made to look for evidence (dried stems and inflorescences) of rare or localized species that respond to rain (e.g. *Geissorhiza karooica*, *Pelargonium githagineum,* etc.) during the survey. I am confident that the species lists that were compiled for the sites are at least 70% complete, but some (annuals and geophytes) may not have been present at the survey periods due to the prolonged drought and grazing impacts.

I am hence reasonably sure that my findings and recommendations 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

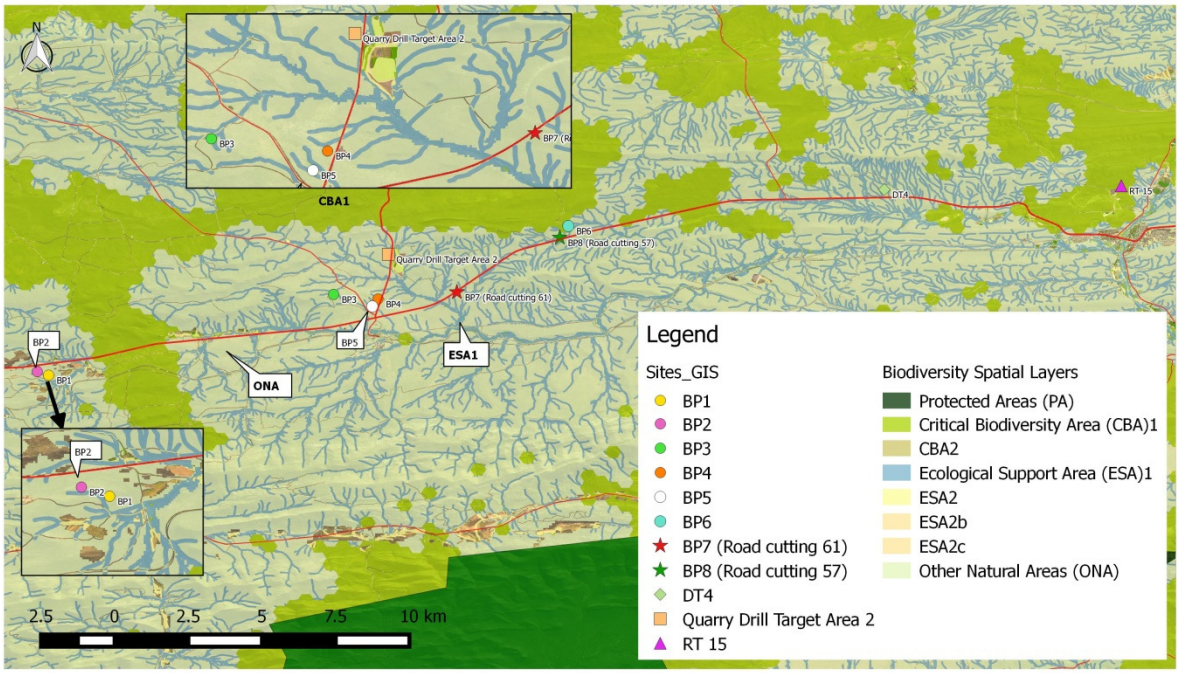
Following the national vegetation classification the proposed borrow pits intercept three vegetation types; Matjiesfontein Quartzite Fynbos, Matjiesfontein Shale Renosterveld and Koedoesberg-Moordenaars Karoo, which all have a status of Least Concerned (see Map 1).



Map 1. National vegetation types intersected by the proposed borrow pit sites.

The regional conservation plan shows that Borrow Pit 6 and the quarry at RT15 intercept a Critical Biodiversity Area (CBA1). All the other sites are located in Other Natural Vegetation, but several of them are at the edge of Ecological Support Areas (ESA1 = water drainage areas) [see Map 2].

More detailed descriptions and comments on the sensitivity of each site are provided below.



Map 2: Regional conservation plan for the affected area.

Borrow Pit 1:

An access road is already established to within about 300 m from the site. The extended access road would intersect a minor water drainage line (ESA1), but no major earthworks would be required to establish the additional approximately 2 m wide access road.

The area consists of Renosterveld (correctly mapped as Matjiesfontein Shale Renosterveld), with about half of the site recently having burnt (see Photo 1). The area is not rich in species, in part since about half the site consists of old agricultural land where mostly just Renosterbos (*Elytropappus rhinocerotis*) re-established, but also since the area has been heavily grazed by domestic stock for many years. The latter is evident through the homogenous nature of the communities, paucity of palatable species and relative abundance of unpalatable species. The following 35 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Anisodontea anomala, Anthospermum aethiopicum, Arctotheca prostrata, Arctotis acaulis, Aspalathus hispida, A. spinosa, Chrysocoma tenuifolia, Dimorphotheca cuneata, Elytropappus rhinocerotis, Galenia africana, Gnidia deserticola, Helichrysum hamulosum, H. rosum, Hermannia althaeifolia, Lobostemon echioides, Oedera genistifolia, O. squarrosa, Pteronia incana, Relhania relhanioides* and *R. tricephala*.

Succulents: *Cleretum papulosum, Drosanthemum archeri* and *Ruschia multiflora*.

Graminoids: *Aristida diffusa, A. congesta, Ehrharta villosa, Enneapogon scaber, Pentameris airoides, P. eriostoma* and *Tribolium hispidum*.

Geophytes: *Chamarea capensis, Cyphia digitata, Moraea lewisiae, M. miniata and Oxalis purpurea*.

Rare and Threatened species: The only uncommon species present is *Relhania tricephala*, which has a status of Near Threatened. No other threatened species were found in the proposed development area and none are expected to occur here, even after good rain.

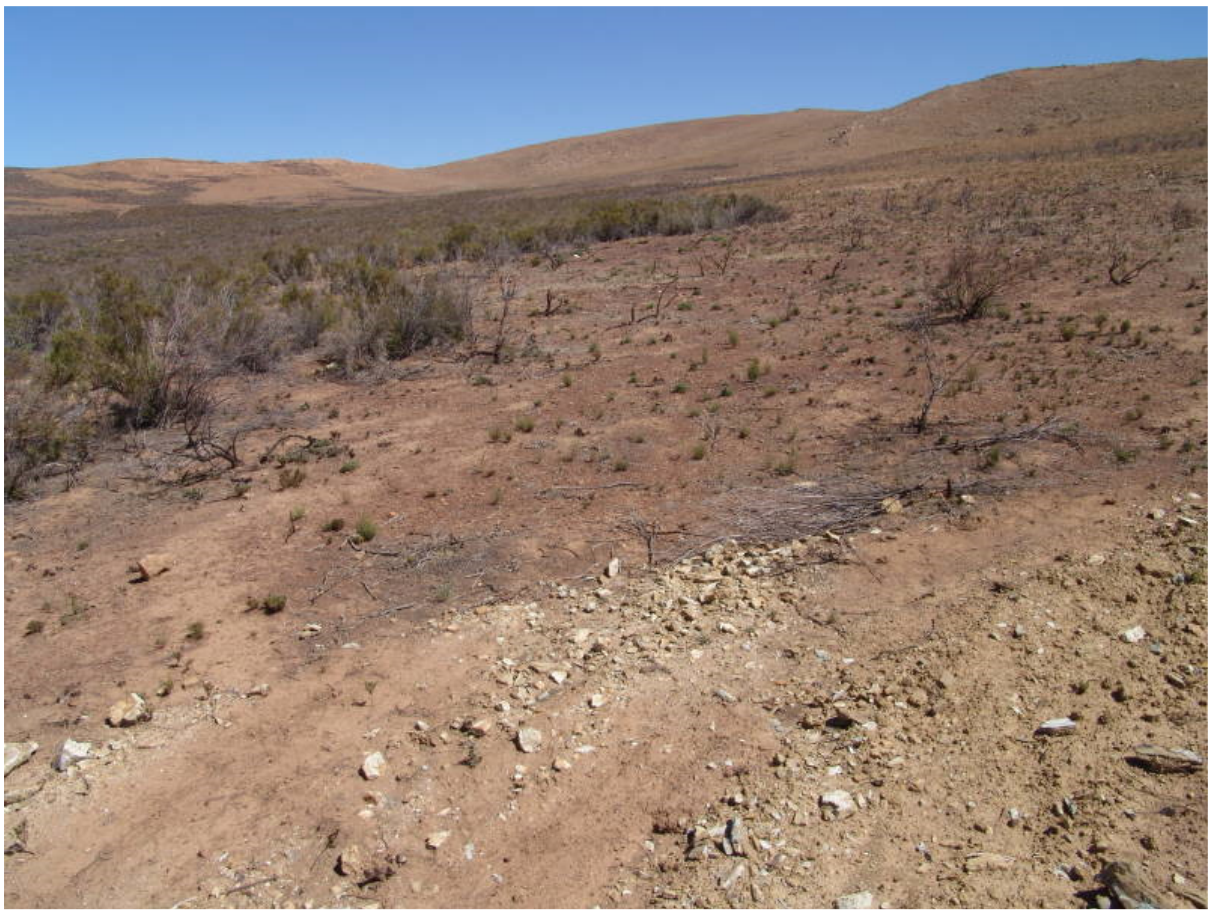


Photo 1: Site of the proposed Borrow Pit 1. Note that part of the site was recently burnt.

Borrow Pit 2:

An access road is already established to the site as it abuts an old quarry (see Photo 2). Most of the vegetation at this site is severely disturbed due to previous activities around the quarry.

The vegetation consists mostly of Renosterveld (but was mapped as Matjiesfontein Quartz Fynbos), with most of the site recently burnt. The area is poor in species due to the previous disturbance of the site and current heavy grazing pressure The following 33 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Anisodontea anomala, Arctotheca prostrata, Aspalathus spinosa, Berkheya heterophylla, Chrysocoma tenuifolia, Dimorphotheca cuneata, Elytropappus rhinocerotis, Galenia africana, Gnidia deserticola, Helichrysum hamulosum, H. rosum, Hermannia althaeifolia, H. cuneifolia, Lobostemon glaucophyllus, Muraltia spinosa, Oedera squarrosa, Pelargonium glutinosum, Pteronia incana* and *Relhania tricephala*.

Succulents: *Cleretum papulosum, Drosanthemum archeri* and *Ruschia multiflora*.

Graminoids: *Aristida diffusa, Ehrharta villosa, Enneapogon scaber, Pentameris airoides, P. pallida, P. tortuosa* and *Tribolium hispidum*.

Geophytes: *Chamarea capensis, Moraea miniata and Oxalis purpurea*.

Rare and Threatened species: The only uncommon species present is *Relhania tricephala*, which has a status of Near Threatened. No other threatened species were found in the proposed development area and none are expected to occur here, even after good rain.

Photo 2: The proposed Borrow Pit 2 site. Note that part of the site burned down recently.

Borrow Pit 3:

An access road is already established to the site as it is adjacent to a kraal and watering point for domestic stock. The site intersects a minor water drainage line and thus an ESA1. The vegetation is moderately to heavily disturbed through grazing and consists of Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo), although it was mapped as Matjiesfontein Renosterveld (see Photo 3). In being heavily grazed in the area closest to the kraal, the site is also not very rich in species and the following 50 species were recorded in the ca. 7 ha area that will be used for the borrow pit.

Shrubs and Herbs: *Amphiglossa tomentosa, A. triflora, Aptosimum spinescens, Chrysocoma tenuifolia, Dianthus thunbergii, Elytropappus rhinocerotis, Eriocephalus brevifolius, E. ericoides, Felicia filifolia, Galenia africana, Helichrysum rosum, Nenax microphylla, Oedera genistifolia, Othonna arbuscular, Pentzia incana, Pteronia empetrifolia, P. flexicaulis, P. glauca, P. pallens, P. paniculata, Rosenia oppositifolia, R. spinescens* and *Tetragonia fruticosa*.

Succulents: *Adromischus liebenbergii, Antimima pygmaea, Cephalophyllum curtophyllum, Cheiridopsis cigarettifera, Crassula alpestris, C. capitella, C. cotyledonis, C. hemisphaerica, C. muscosa, C. rupestris, C. subaphylla, C. tetragona, Drosanthemum lique, D. tuberculiferum, Euphorbia decussata, E. rhombifolia, Ruschia cradockensis, R. crassa, R. inclusa, R. pungens, Senecio longiflorus, S. radicans, Tylecodon reticulata* and *T. wallichii,*

Graminoids: *Pentameris eriostoma* and *Stipagrostis obtusa.*

Geophytes: *Cyphia digitata, Eriospermum capense, Moraea miniata* and *M. polystachya.*

Rare and Threatened species: No threatened species were found in the proposed development area and none are expected to occur here, even after good rain *Ruschia inclusa* is the only uncommon species present, but its conservation status has not been evaluated yet..

Photo 3: Succulent Karoo vegetation at the proposed Borrow Pit 3.

Borrow Pit 4:

An access road is already established to within about 100 m from the center point of the site. The affected area consists of Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo) (see Photo 4). The area is not very rich in species, mostly since the area has been heavily grazed by domestic stock for many years. The following 45 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Amphiglossa triflora, Aptosimum spinescens, Chrysocoma tenuifolia, Dianthus thunbergii, Elytropappus rhinocerotis, Eriocephalus ericoides, E. grandiflorus, Euryops lateriflorus, Felicia filifolia, Galenia africana, Helichrysum rosum, Pentzia incana, Pteronia empetrifolia, P. flexicaulis, P. glauca, P. incana, P. pallens, P. paniculata, Rosenia oppositifolia, Salsola aphylla* and *Tetragonia fruticosa*.

Succulents: *Adromischus liebenbergii, A. maculatus, Antimima cf. pygmaea, Cephalophyllum curtophyllum, Cheiridopsis cigarettifera, Crassula capitella, C. cotyledonis,*

C. muscosa, C. pyramidalis, C. subaphylla, C. tetragona, Drosanthemum tuberculiferum, Euphorbia decussata, E. multiceps, Haworthia arachnoidea, Kleinia longiflorus, Pachypodium bispinosum, Pelargonium crithmifolium, Ruschia cradockensis, R. crassa, R. pungens and *Tylecodon reticulata.*

Graminoids: *Stipagrostis obtusa.*

Geophytes: *Moraea polystachya*.

Rare and Threatened species: No threatened species were found in the proposed development area and none are expected to occur here, even after good rain. The only uncommon species present is *Eriocephalus grandiflorus* (status = Rare).

Photo 4: Site of the proposed Borrow Pit 4.

Borrow Pit 5:

This site is close to Borrow Pit 4, it is in the same grazing camp and the vegetation and its condition is hence very similar to those of Site 4. An access road is also already established to within about 100 m from the center point of the site. The affected area also consists of Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo) (see Photo 5) and the following 31 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Amphiglossa triflora, Aptosimum spinescens, Chrysocoma tenuifolia, Eriocephalus ericoides, Euryops lateriflorus, Felicia filifolia, Galenia africana, Helichrysum rosum, Pentzia incana, Pteronia empetrifolia, P. flexicaulis, P. glauca, P. incana, P. pallens, Rosenia oppositifolia, Salsola aphylla* and *Tetragonia fruticosa*.

Succulents: *Cephalophyllum curtophyllum, Cheiridopsis cigarettifera, Crassula capitella, C. cotyledonis, C. muscosa, C. subaphylla, Euphorbia decussata, E. multiceps, Ruschia cradockensis, R. pungens* and *Tylecodon reticulata.*

Graminoids: *Cenchrus ciliaris* and *Stipagrostis obtusa.*

Geophytes: *Moraea polystachya*.

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

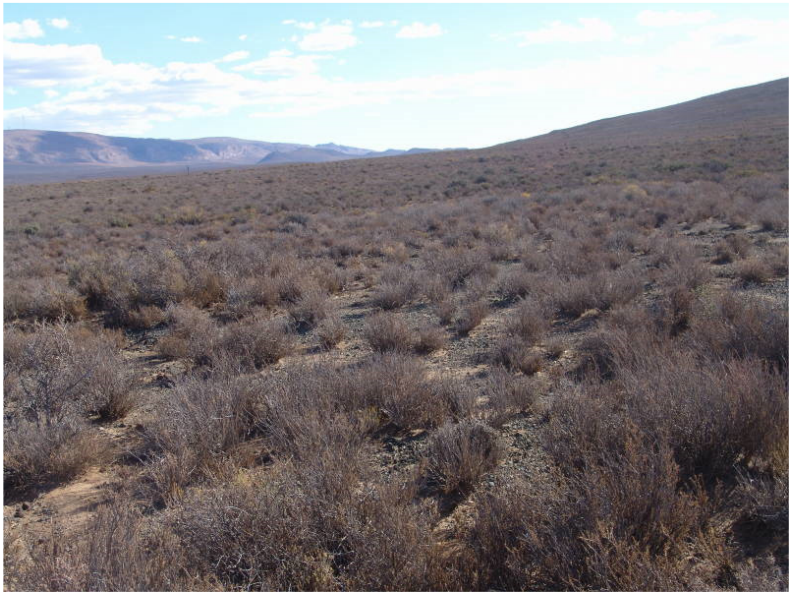


Photo 5: Site of the proposed Borrow Pit 5. This site is poorer in species than Site 4.

Borrow Pit 6:

An access road is also already established to within about 100 m from the center point of the site. The affected area also consists of Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo) with the local community varying little over the terrain (see Photo 6) and the following 27 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Berkheya heterophylla, Eriocephalus ericoides, E. decussatus, Euryops lateriflorus, Galenia africana, Helichrysum rosum, Lycium cinereum, Pentzia incana, Pteronia empetrifolia, P. glauca, P. pallens, P. succulenta, Rosenia humilis, Salsola aphylla, Thesium lineatum* and *Zygophyllum microcarpum*.

Succulents: *Aloe variegata, Crassula muscosa, C. subaphylla, Euphorbia decussata, Kleinia longiflora, Mesembryanthemum coriandrum, M. splendens, M. vaginatum, Ruschia cradockensis, R. crassa* and *Tylecodon reticulata.*

Graminoids: *Stipagrostis obtusa.*

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

Photo 6: Site of the proposed Borrow Pit 6. Note the evenness of the plant communities.

Borrow Pit 7 (= Cutting 57):

There is no access road to this site and the affected area consists of near pristine Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo; see Photo 7) which is rich in species, especially in the vicinity of a quartz band that transects the area. The following 56 species were recorded in the ca. 2 ha area that may be disturbed to establish the borrow pit, but many more species may appear after good rain.

Shrubs and Herbs: *Amphiglossa tomentosa, Chrysocoma tenuifolia, Dianthus laingsburgensis, Eriocephalus ericoides, E. decussatus, E. namaquensis, Euryops lateriflorus, Felicia filifolia, Galenia africana, G. fruticosa, G. portulacacea, Helichrysum rosum, Hirpicium integrifolia, Pentzia incana, Pteronia empetrifolia, P. glauca, P. pallens, P, paniculata, Rosenia humilis, R. oppositifolia, Tetragonia sarcophylla, Thesium lineatum* and *Ursinea pilifera*.

Succulents: *Anacampseros telephiastrum, Bulbine torta, Antimima pygmaea, Cheiridopsis namaquensis, Conophytum minimum, C. piluliforme, Crassula columnaris, C. muscosa, C. subaphylla, C. tomentosa, Euphorbia decussata, E. stolonifera, Haworthia nortieri* var. *pehlemanniae, Mesembryanthemum archeri, M. coriandrum, M. splendens, Ruschia cradockensis, R. crassa, Senecio acaulis, S. radicans, Tylecodon paniculata* and *T. reticulata.*

Graminoids: *Aristida diffusa* and *Ehrharta erecta.*

Geophytes*: Albuca cooperi, A. glandulosa, Chamarea capensis, Cyphia digitata, Drimia convallaroides, Geissorhiza karooica, Lachenalia ameliae, Ornithogalum hispidum, Massonia echinata, Moraea crispa* and *M. karooica.*

Rare and Threatened species: *Geissorhiza karooica* (Status = Near Threatened), *Haworthia nortieri* var. *pehlemanniae* has no formal status due to taxonomic uncertainty, but should be regarded as a threatened species. I suspect that several other rare or threatened species will be found at this site after good rain.

Photo 7: Near-pristine Succulent Karoo vegetation at proposed Borrow Pit 7. Here only a narrow band of vegetation (in the foreground) next to the N1 is disturbed. Some rare and threatened species are present at this site, but several more may appear after good rain.

Borrow Pit 8 (= Cutting 61):

This site is located adjacent to an old quarry site (see Photo 8) and an access road is already established to the site. The vegetation consists of moderately to severely disturbed Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo). The proposed borrow pit is located between two water drainage areas (ESA1), but the proposed mining area does not intersect the water drainage areas. The following 45 species were recorded in the ca. 0.43 ha area that may be disturbed to establish the borrow pit.

Shrubs and Herbs: *Berkheya heterophylla, B. spinosa, Chrysocoma tenuifolia, Eriocephalus ericoides, E. decussatus, Euryops lateriflorus, Galenia africana, G. fruticosa, Helichrysum rosum, Pentzia incana, Pteronia glauca, P. pallens, P. paniculata, P. sordida, Tetragonia fruticosa, Thesium lineatum* and *Zygophyllum microcarpum*.

Succulents: *Anacampseros telephiastrum, Aloe variegata, Astroloba pentagona, Cephalophyllum curtophyllum, Cheiridopsis namaquensis, Crassula capitella, C. deltoidea,*

C. muscosa, C. subaphylla, Drosanthemum lique, Euphorbia decussata, E. stolonifera, Hereroha jouberti, Mesembryanthemum excavatum, M. guerichianum, M. splendens, M. vaginatum, Ruschia cradockensis, R. crassa, R. spinosa and *Tylecodon reticulata.*

Graminoids: *Tribolium hispidum.*

Geophytes*: Albuca glandulosa, Cyphia digitata, Dipcadi brevifolium, Drimia convallaroides, Lachenalia ameliae* and *Moraea karooica.*

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

Photo 8: Vegetation at the proposed Borrow Pit 8. The greyish area in the central background is part of the previous borrow pit area.

DT 4:

An access road is established almost to the site, but the vegetation consists otherwise of near pristine Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo) on tillite hills (see Photo 9). The affected area is rich in species, with the following 81 species recorded in the ca. 5 ha area that may be disturbed to establish the quarry.

Trees: *Euclea undulata* and *Searsia burchellii.*

Shrubs and Herbs: *Acanthopsis dispermoides, Aptosiphon spinescens, Berkheya spinosa, Blepharis capensis, Cadaba aphylla, Chrysocoma tenuifolia, Cissampelos capensis, Dianthus laingsburgensis, Eriocephalus ericoides, E. decussatus, Galenia fruticosa, G. portulacacea, Garuleum bipinnatum, Gazania krebsiana, Helichrysum pumilio, H. lucilioides, H. rosum, Hermannia cuneifolia, H. filifolia, H. nana, Hirpicium alienatum, Justicea cuneata, Leysera tenella, Limeum aethiopicum, Lycium cinereum, L. ferocisimum, Microloma massonii, Osteospermum microphyllum, O. scariosum, O. sinuatum, Pentzia incana, Pteronia empetrifolia, P. glauca, P. oppositifolia, P. pallens, P. sordida, P. succulenta, Rhigozum obovatum, Rosenia humilis, Sericocoma aveolans, Selago albida, Teragonia sarcophylla, Thesium lineatum, Ursinea nana* and *Zalyzianskya venusta*.

Succulents: *Aloe variegata, Adromischus liebenbergii, Conophytum minimum, C. piluliforme, Crassula barbata, C. muscosa, C. subaphylla, C. tomentosa, Euphorbia decussata, E. rhombifolia, Hereroha jouberti, Hoodia grandis, Mesembryanthemum coriandrum, M. noctiflorum, M. splendens, Monsonia crassicaule, Pleispilos canus, Ruschia cradockensis, R. spinosa* and *Tylecodon reticulata.*

Graminoids: *Aristida diffusa, Ehrharta calycina* and *Tribolium hispidum.*

Geophytes*: Albuca glandulosa, Asparagus aethiopicus, A. retrofractus, A. striatus, Cyphia digitata, Dipcadi brevifolium* and *Moraea polystachya.*

Ferns: *Mohria caffrorum* and *Pellaea rufa*.

Rare and Threatened species: None of the above are threatened species, but the fern *Pellaea rufa* is a naturally rare species with a restricted distribution. Some threatened species may appear after good rain at this site.

Photo 9: Vegetation of the proposed site DT 4.

RT 15:

This site is an extension of an existing quarry that is located within an intensively farmed area with an existing access road to the site. The remaining natural vegetation consists of highly disturbed Succulent Karoo vegetation (Koedoesberg-Moordenaars Karoo; see Photo 10). The site falls within a CBA, which is clearly a mapping mistake as even the pivot point irrigated lands were included in the CBA. The site is poor in species and only the following 42 species were recorded in the ca. 7 ha area that may be disturbed to establish the borrow pit.

Trees: *Searsia burchellii.*

Shrubs and Herbs: *Aptosimum spinescens, Asclepias buchenaviana, Berkheya spinosa, Blepharis capensis, Chrysocoma tenuifolia, Dicoma spinosa, Eriocephalus ericoides, E. decussatus, Euryops annularis, E. lateriflorus, Galenia africana, Garuleum bipinnatum, Helichrysum rosum, Hermannia althaeifolia, Lycium ferocissimum, Osteospermum sinuatum,*

Othonna pteronioides, Pentzia incana, Pteronia glauca, P. pallens, P. sordida, Rhigozum obovatum, Tetragonia fruticosa, Thesium lineatum and *Zygophyllum microcarpum*.

Succulents*: Anacampseros arachnoides, Crassula muscosa, C. subaphylla, Drosanthemum archeri, Euphorbia decussata, Hereroha crassa, Kleinia longiflora, Mesembryanthemum guerichianum, M. splendens, M. vaginatum, Ruschia cradockensis, R. spinosa* and *Tylecodon reticulata.*

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

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

Photo 10: Vegetation at the site named RT 15. The old quarry will be extended towards the foreground.

Drill Target Area 2:

Although the affected area is relatively close to Borrow Pit 4, with a similar national vegetation type (Koedoesberg-Moordenaars Karoo) and conservation status, the vegetation is quite different as it occurs on a different geology formation (Tillite).

On this site the vegetation is still quite rich in species as it is only moderately transformed through grazing impacts by domestic stock. The following 47 species were recorded in the potentially affected area.

Shrubs and Herbs: *Chrysocoma tenuifolia, Dianthus lainsburgensis, Elytropappus rhinocerotis, Eriocephalus ericoides, E. grandiflorus, Euryops lateriflorus, Felicia filifolia, Galenia africana, Helichrysum rosum, Hermannia altheifolia, H. cuneifolia, Hirpicium alienatum, Pentzia incana, Pteronia empetrifolia, P. flexicaulis, P. glauca, P. incana, P. pallens, P. paniculata, Rosenia oppositifolia, Salsola aphylla* and *Tetragonia fruticosa*.

Succulents: *Antimima pygmaea, Crassula capitella, C. cotyledonis, C. muscosa, C. pyramidalis, C. subaphylla, C. tetragona, Drosanthemum liqua, D. tuberculiferum, Euphorbia loricata, Mesembryantium junceum, M. nocticlorum, M. splendens, M. tortuosum, Pelargonium crithmifolium, Ruschia cradockensis, R. crassa, R. pungens, Trichodiadema intonsum* and *Tylecodon wallichi.*

Graminoids: *Stipagrostis obtusa.*

Geophytes: *Colchium eucomoides, Cyphia digitata, Ornithogalum dubium* and *Moraea polystachya*.

Rare and Threatened species: *Lotononis exstipulata* (Status = Endangered).

The vegetation of the site is illustrated in Photo 11.

Photo 11: The moderately transformed vegetation of site DT2.

CONCLUSIONS AND RECOMMENDATIONS

None of the proposed 11 borrow pit sites occur within a threatened vegetation type. Borrow Pit 6 falls on the edge of a Critical Biodiversity Area and site RT15 was erroneously mapped as a Critical Biodiversity Area. Several of the sites are adjacent to Ecological Support Areas (ESA1 = seasonal water drainage areas). A small population of one threatened plant species was recorded at Site DT2 and populations of several rare species (some with status = Near Threatened) were found at some of the other sites. The ecological condition of the vegetation was good at a few sites and it is possible that other threatened/rare species may appear after good rain at these sites.

In table 1 below I provide a crude rating of the botanical significance for each of the ca. 7 ha proposed development sites.

Table 1: Rating of the botanical/ecological sensitivity of each site.

Site Name	Sensitivity	Motivation
BP1	Not Sensitive	Vegetation in poor ecological condition. One near threatened species present.
BP2	Not Sensitive	Vegetation in poor ecological condition. One near threatened species present.
BP3	Moderately	Vegetation in poor ecological condition, intersect ESA.
BP4	Not Sensitive	Vegetation in poor ecological condition.
BP5	Not Sensitive	Vegetation in poor ecological condition.
BP6	Moderately	Vegetation in fair ecological condition, abutting CBA.
RT 15	Not Sensitive	Degraded vegetation, albeit included in CBA.
DT4	Sensitive	Vegetation in good condition, more rare species may be present.
BP7 (Road cutting 61)	Sensitive	Vegetation in good condition, more rare species may be present.
BP8 (Road cutting 57)	Not Sensitive	Vegetation in poor ecological condition.
Quarry Drill Target Area 2	Moderately	Vegetation in fair ecological condition, one threatened species present.

The sites marked as moderately sensitive should ideally not to develop, but some of these sites may be required to ensure that adequate material is available for the upgrading of the road. Of the sites marked moderately sensitive I regard site DT2 as the most conservation worthy, but the loss of the relatively small population of the threatened species at this site may not be of high significance as this species probably occurs elsewhere along this range of tillite hills.

I do not propose any search-and-rescue operation to salvage plants at the proposed development sites as such an endeavor will have a very low success rate. For the affected vegetation types it is to my opinion much better to avoid sensitive sites that harbor rare and threatened species. I hence do not support the development of the two sites indicated as sensitive (DT 4 and BP7) in Table 1. Both these sites are in a near-pristine ecological condition and the development of these two sites will, to my opinion result in a significant loss of vegetation (perhaps also threatened species) that is of conservation value.

In conclusion I do not foresee that the development of the borrow pit and quarry sites will have a significant negative impact on the flora, vegetation or local ecological processes if the following mitigation actions are taken;

1. Sites DT4 and BP7 should not be developed. If possible DT2 should also not be developed.
2. The water drainage areas (ESA1) should not be negatively affected by the development of the sites, including access roads.
3. The embankment of at least one of the sides of the borrow pits and quarries should not exceed a slope of 20 degrees during and after the operational phase to ensure that animals that enter or fall into the cavity can escape safely.
4. Fence off the boundary of each of the proposed development areas at the beginning of the construction phase to prevent gradual expansion of the mined area.
5. At the end of the operational phase, where possible, landscape the site and rehabilitate the disturbed area with locally indigenous species.
6. To facilitate the restoration of the site at the end of the operational phase, remove all the topsoil (to a depth of 100 mm) during the operational phase and store it in berms not wider than 2 m or higher than 1 m. The stored topsoil must be used to cover the landscaped area at the end of the operational phase.

REFERENCES

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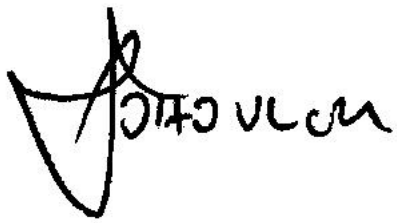
Appendix 1: DECALARATION OF INDEPENDANCE

I J.H.J. Vlok as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).



Signature of the Specialist:	
Name of Company:	Regalis Environmental Services CC
Date:	20th November 2019

Appendix 2: Impact Assessment for the proposed borrow pit and quarry sites. This assessment considers the cumulative impacts of the individual sites, with and without mitigation actions that are listed below.

Without proposed mitigation actions

Impact description	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Loss of sensitive terrestrial vegetation.	Local	Low	Long term	Definite	Certain	Irreversible	Medium
Loss of sensitive riverine vegetation.	Local	Low	Long term	Definite	Certain	Irreversible	Medium

With proposed mitigation actions

Impact description	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Loss of sensitive terrestrial vegetation.	Local	Low	Long term	Definite	Certain	Irreversible	Low
Loss of sensitive riverine vegetation.	Local	Low	Long term	Definite	Certain	Irreversible	Low

Proposed mitigation measures;

1. Sites DT4 and BP7 should not be developed. If possible DT2 should also not be developed.
2. The water drainage areas (ESA1) should not be negatively affected by the development of the sites, including access roads.
3. The embankment of at least one of the sides of the borrow pits and quarries should not exceed a slope of 20 degrees during and after the operational phase to ensure that animals that enter or fall into the cavity can escape safely.
4. Fence off the boundary of each of the proposed development areas at the beginning of the construction phase to prevent gradual expansion of the mined area.
5. At the end of the operational phase, where possible, landscape the site and rehabilitate the disturbed area with locally indigenous species.
6. To facilitate the restoration of the site at the end of the operational phase, remove all the topsoil (to a depth of 100 mm) during the operational phase and store it in berms not wider than 2 m or higher than 1 m. The stored topsoil must be used to cover the landscaped area at the end of the operational phase.

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 >25 with > 1 000 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).