

Loss of Coastal Duneveld					
Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study Area	Low - Moderate	Definite	LOW - MODERATE-
With mitigation	Permanent	Study Area	Low	Definite	LOW-

**Mitigation and Management:**

No specific mitigation required for this habitat in terms of the operational phase, as it will not be impacted by mining.

**7.5.5 Impacts Associated with Issue 2: Loss of Species of Conservation Concern**

**Impact 8: Loss of Species of Conservation Concern**

**Cause and comment:**

Mining activities and the associated infrastructure will result in the loss of portions of the local subpopulations of at least 17 plant Species of Conservation Concern (SCC), as well as other species that are important to ecosystem functioning. Prospecting in the greater project area could potentially impact on a further six SCC, although the likelihood of this impact is much lower. Appendix 2 lists the SCC likely to be impacted by the proposed mining footprint, and in the possible prospecting areas, and the significance thereof for each species. Three species are of particular concern – *Lachenalia* sp nov (*arenicola* MS), *Agathosma elata* and *Lampranthus procumbens*.

**Significance Statement:**

The mining activities will definitely result in the loss of portions of local subpopulations of up to 17 plant SCC and this will have a **severe permanent** impact. The environmental significance of this unmitigated impact would be HIGH NEGATIVE. Standard mitigation measures may reduce this to a MODERATE - HIGH NEGATIVE impact, and if combined with the implementation of a suitable biodiversity offset this impact could be further reduced to LOW - MODERATE NEGATIVE.

Current Impacts					
Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH-
With Mitigation	Permanent	Study Area	Moderate	Probable	MODERATE - HIGH-
With Mitigation & Biodiversity Offset	Permanent	Study Area	Moderate	Probable	LOW – MODERATE -

**Mitigation and Management:**

The following mitigation actions are suggested:

- All bulbs (geophytes) of Conservation Concern in the mining area (notably *Lachenalia* sp nov/*arenicola*) should be subject to Search and Rescue in the winter to spring season (June – September) preceding any mining. These plants should be located by suitably qualified staff or consultants who can identify the species. The plants should be immediately translocated to a similar, suitable receiving environment that will not be disturbed by mining activities at any stage in the future.

- All succulents of Conservation Concern in the mining area (notably *Lampranthus procumbens*) should be subject to Search and Rescue in the autumn (April – May) preceding any mining. These plants should be located by suitably qualified staff or consultants who can identify the species. The plants should be immediately translocated to a similar, suitable receiving environment that will not be disturbed by mining activities at any stage in the future.
- A nursery should be set up in the project area to propagate all possible SCC from within the mining area, and the propagated plants should be returned to the post mining landscape about three years after initial rehabilitation has been completed. Planting out should take place after the first good winter rains, typically in May or June. Material for propagation should be sourced from the pre mining areas.
- The applicant should set aside undisturbed habitat that conserves at least 30% of the project area populations of all SCC recorded from the project area. Key areas in this regard include the ecological corridors (defined in Figure 6.2). These areas should be managed as conservation areas.
- A suitable biodiversity offset should be implemented within 5 years of any project approval, whereby at least 2500ha of natural habitat known to support the SCC is purchased by the applicant and added to the Namaqua National Park (either by donation or contract). The offset should be located within one of the three priority areas identified in Figure 7-2.

**Impact 9: Fragmentation of vegetation and edge effects**

**Cause and comment:**

Habitat fragmentation is potentially one of the most important impacts on the vegetation, and this also has knock on effects on the associated fauna. Fragmentation occurs wherever previously continuous vegetation is lost or degraded, and results in a reduction in the total gene pool and a decrease in species richness and diversity. Fragmentation results in the isolation of functional ecosystems, and results in reduced biodiversity and reduced movement due to the absence of ecological corridors. The site is currently unfragmented in about 90% of the area, with partial fragmentation due to clearing of agricultural lands and heavy grazing in about 10% of the total area. Many of these agricultural lands have been fallow for over a decade and are now partly rehabilitated (although most are heavily grazed, which reduces their rehabilitation potential). Edge effects relate to the proximity of natural vegetation to disturbed or mined areas, and these edges are often invaded by alien species, and may also be impacted by windblown dust, etc. It is acknowledged that less than 300ha will be mined at any one time, and that the remainder of the mining area blocks will either thus be undergoing rehabilitation or standing undisturbed, depending on the project phase, which will help reduce overall fragmentation of the site.

**Significance Statement:**

The mining activities will definitely result in habitat fragmentation and edge effects and this will have a **severe permanent** impact. The environmental significance of this unmitigated impact would be HIGH NEGATIVE. This will be reduced to MODERATE NEGATIVE with mitigation.

Current Impacts					
Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study Area	Severe	Definite	<b>HIGH-</b>
With Mitigation	Permanent	Study Area	Moderate	Definite	<b>MODERATE-</b>

**Mitigation and Management:**

The following mitigation actions are suggested:

- Ongoing alien invasive vegetation management in the mining and project area for the duration of life of mine.

- Setting aside key representative portions of each vegetation type as conservation areas (as depicted in the proposed corridor map) within the project area.
- There must be a north-south corridor at least 300 m wide through the project area at all times. This corridor will be along the eastern side of Roode Heuwel during years 1-5 of mining and along the western edge of the project site once rehabilitation has been completed, for the remainder of the mine life.
- Best practise rehabilitation of mined areas as soon as feasible after cessation of mining of each block.
- Mining of only one block at a time (all blocks <300ha in extent), with concurrent rehabilitation of any previously mined blocks, and no disturbance of blocks that will only be mined in the future.

**Impact 10: Increased dust levels on vegetation**

**Cause and comment:**

Increased dust levels are common during construction and bush clearance and are also a major consequence of vehicular traffic, even on paved surfaces. Dust settling on adjacent vegetation can block plant photosynthesis, respiration and transpiration, in addition to causing physical injuries to plants (Farmer, 1993), but its most important impact probably relates to smothering of the anthers and stigmas of flowering plants and the consequent reduction in pollination success and seed set. Dust from road surfaces can also transport chemical pollutants to adjacent regions, thus affecting riparian ecosystems via impacts on water quality.

**Significance Statement:**

Dust levels will be raised during the construction and operation of the mine and will **definitely** have a **moderate, long term** impact. The environmental significance of this unmitigated impact would be MODERATE NEGATIVE. Mitigation measures will reduce the impact to a LOW NEGATIVE.

Current Impacts					
Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Long Term	Study Area	Moderate	Definite	<b>MODERATE -</b>
With Mitigation	Short Term	Study Area	Slight	Probable	<b>LOW-</b>

**Mitigation and Management:**

The following mitigation actions are suggested:

- Haul roads and the heavy use areas around the main plant should be compacted and treated with dust inhibitors.
- Heavy vehicle speed limits on unpaved roads on site should be 40km/h.
- Wind fences should be erected at suitable intervals (probably every 5m) on all recently mined and rehabilitated areas.
- Only single blocks should be mined at any one time, with no block being bigger than 300ha.

**Impact 11: Invasion of alien species**

**Cause and comment:**

The removal of existing vegetation creates ‘open’ habitats that will inevitably be colonised by pioneer plant species. While this is part of a natural process of regeneration, which would ultimately lead to the re-establishment of a secondary vegetation cover, it also favours the establishment of undesirable species in the area. These species are introduced along transport lines, and by human and animal movements in the area. Once established, these species are typically very difficult to eradicate and may then invade, posing a threat to neighbouring habitats. The primary invasive alien species are likely to be *Atriplex lindleyi* ssp *inflata* (blasiebrak) and

*Salsola kali* (Russian tolbos), both already present in the area.

**Significance Statement:**

The mining activities will very probably result in the proliferation of alien invasive plants in the mining and project area, which will have a **moderate, permanent** impact. The environmental significance of this unmitigated impact would be MODERATE NEGATIVE. Mitigation measures could reduce the impact to a LOW NEGATIVE.

Current Impacts					
Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study Area	Moderate	Very Probable	<b>MODERATE -</b>
With Mitigation	Permanent	Study Area	Slight	Probable	<b>LOW-</b>

**Mitigation and Management:**

The following mitigation actions are suggested:

- Prepare an Alien Management Plan, with ongoing, annual alien vegetation management throughout the project area, and in the mining area and along roads in particular.
- Eradicate alien invasive plants as they appear. Alien invasive plants should be stockpiled and burnt to destroy their seeds.
- Do not use any alien grasses (eg. *Lolium* - ryegrass) for rehabilitation purposes.
- Do not allow livestock on the mining site during the life of mine and for at least 10 years after mine closure, as livestock grazing will selectively remove the palatable species and leave the unpalatable species. The latter are typically the common, weedy species that dominate most disturbed areas, and once established are difficult to remove.
- Put in place environmentally acceptable procedures for waste management.
- Monitor the project area for any new invasive plant species, and remove them as they appear.

**7.5.6 Decommissioning Phase**

The decommissioning of the project could have a positive impact on the natural vegetation in the mining area, if the areas are restored to a near-natural state.

However, rehabilitating disturbed areas to a natural or near-natural condition may not meet the livelihood requirements of the project-affected communities, whose needs may be better served by allowing the area to be used for small stock grazing. In this case the decommissioning phase will probably result in a net loss of plant diversity, as natural vegetation will be altered by mining, followed by rehabilitation and grazing (further altering the natural species composition in favour of less palatable species), and thus this would be considered to be a negative ecological impact.

It is strongly recommended that livestock not be introduced into the mined and rehabilitated areas for at least ten years after initial rehabilitation has been completed on the last block to be mined. Removal of livestock will dramatically improve rehabilitation by allowing flowering and seed set for the more palatable species. It is recommended that the area be stocked with limited numbers of range appropriate game, and the possibility of tourist accommodation could be explored.

## 8. CONCLUSIONS AND RECOMMENDATIONS

### 8.1 CONCLUSIONS

The vegetation and habitat in the project area is generally in good condition, but the effects of stock and crop farming are evident in places, some land portions being significantly more overgrazed than others. In general the western parts are less heavily impacted by grazing than the eastern parts, and areas with goats are more heavily impacted than areas without. Most of the coastal section is in good condition, apart from old diamond camps and diggings, numerous tracks, and some kelp harvesting stockpile areas. Altogether some 25 plant Species of Conservation Concern (SCC) were recorded in the study area (17 in the mining area), including 6 species not yet formally named or described, and large scale mining could thus have a significant negative impact on some of these species and the overall flora if adequate mitigation is not put in place.

This report has:

1. Identified and mapped the main vegetation types and plant communities;
  - Five (5) key vegetation types occur on the Zirco prospecting area, namely:
    - **Strandveld** (Namaqualand Strandveld)
      - This unit often forms a complex mosaic with Sand Fynbos, and the ecotones (ecological transitions) may be very gradual. Six plant SCC were found in this unit, more than expected. The most significant was a very large population of *Leucoptera nodosa* (Vulnerable) comprising about 50% of the known population of this species (on Leeuvlei).
    - **Sand Fynbos** (Namaqualand Sand Fynbos)
      - This is the richest vegetation type in the study area in terms of number of threatened plant species, with no less than 15 SCC recorded, including two undescribed species, and a new record of the buchu *Agathosma elata* (Endangered), which was previously only known from the Vanrhynsdorp and Nardou area (150km to the southeast). The northern parts of this unit support all 15 SCC, whereas the southern parts have only 10 of the SCC in the unit. About 1100ha of the northern section of Sand Fynbos falls within the proposed mining footprint and about 2200ha of this vegetation unit in the project area lies outside the likely mining area (mainly to the northwest and northeast).
    - **Heuweltjieveld** (Namaqualand Heuweltjieveld)
      - The big surprise was a large quartz patch in this habitat near the Outeep river which yielded two undescribed vygie species, never previously recorded, and which appear to be restricted to this tiny area. This patch also yielded another four SCC, including some surprising range extensions.
    - **Riparian vegetation** (Namaqualand Riviere)
      - This unit is a seasonal wetland that varies from *Acacia* thicket to alluvial halophytic shrublands, and it provides an important corridors function for bird species. No plant SCC were found in this unit, and none are likely to occur here
    - **Klipkop Shrubland** (Namaqualand Klipkoppe Shrubland)
      - This unit provides important sites for local reptile populations, but no plant SCC were recorded in this vegetation unit, and none are likely to occur, mainly because it occupies only a very small part of the study area, and is very widespread outside the study area.
  - Two (2) key vegetation types occur within the coastal assessment area (Figures 4.3-4.6):
    - **Seashore Dunes**
      - Occurs as a belt along the coastline, above the high water mark, and on the seaward side of the Coastal Duneveld. Two SCC were recorded in this unit: *Helichrysum dunense* (Vulnerable) and *Oncosiphon schlechteri* (Endangered). The former occurs at proposed Gulley Intakes 1 and 4, and the latter at Gulley Intake 3.

- **Coastal Duneveld**
    - Is situated on the inland side of the Seashore Dunes, and eventually merges into Strandveld further inland. No SCC were recorded in this unit.
2. Identified and recorded the main plant species that occur within the concession area as well as the coastal assessment area;
    - A full list of plant species recorded in the area is presented in Appendix 1, and totals 270 species. Given the size of the study area, and the fact that only two site visits were undertaken, not all species are likely to have been recorded, but it is estimated that at least 80% of the species present have been recorded.
  3. Identified plant SCC;
    - The area supports at least 25 plant SCC, a surprisingly high number, which includes at least 6 species not yet formally named or described. Two of these were previously unknown species that appear to be restricted to a very small part of the study area (near the Outeep river in the northeast, on Leeuvlei).
  4. Described the likelihood of other SCC occurring in the vicinity;
    - There is a medium likelihood that a few (<5) additional SCC would be found in the study area if additional fieldwork was undertaken at different times of the year.
  5. Assessed the extent of alien plant species over the site, and associated risks of alien invasion as a result of the mining project;
    - See section 4.3
  6. Identified significant landscape features or rare or important vegetation/faunal associations such as seasonal wetlands, seeps or rocky areas that might support rare or important vegetation/faunal associations;
    - Various areas or features of particular conservation concern have been identified in the project area, all of which should ideally be avoided during mining operations. These features are:
      - Wetlands and rivers
      - Steep slopes, rocky areas and areas with shallow soils, including the Soutfontein calcrete outcrops (on Leeuvlei)
      - The northern Sand Fynbos area (mainly on Roode Heuvel)
      - Outeep quartz patches (on Leeuvlei)
      - Shelly coastal platform at Gulley Intake 3
      - Dunes at Gulley Intake 1
      - The main population of *Leucoptera nodosa* (on Leeuvlei)

It should be possible to avoid impacting these areas from mining, with the exception of about 1100ha of the northern Sand Fynbos area.
  7. Placed the project area within the biodiversity context of the wider area;
    - See section 4.1, as well as sections 5.2-5.5.
  8. Provided a sensitivity map of the concession and coastal assessment areas in order for the proponent to better place the layout of the project infrastructure.
    - Refer to Chapter 6.

## 8.2 RECOMMENDATIONS

1. Mine construction phase planning should, as far as possible, be informed by the botanical sensitivity mapping, so as to minimize what could otherwise be very significant negative botanical impacts. Where possible, discretionary facilities (those that are not tied to any particular area) should be located in areas of lowest sensitivity.
2. All Very High sensitivity areas shown in Figure 6.2, with the exception of the small portion of Klipkop Shrubland that may be impacted upon by mining activities in the southern section of Leeuvlei, should be treated and managed as conservation areas and should not be subject to prospecting or mining.
3. All High sensitivity areas that have been incorporated into the proposed ecological corridors, especially areas covered by northern Sand Fynbos, should be treated and managed as conservation areas and should not be subject to prospecting or mining.
4. All Very High and High sensitivity areas not subject to mining (specifically on the Roode Heuvel Prospecting Area) should be offered to the Namaqua National Park, presumably after mining has ceased, but the northwestern areas (adjacent to the Park) should be offered as soon as possible,. Areas of Very High and High sensitivity should also be offered to the NNP, if the land is acquired and mining proceeds at a later stage.
5. Provided that the Namaqualand Strandveld and Namaqualand Heuweltjieveld areas within the total project area are treated and managed as conservation areas for the full Life of Mine no additional offset is required for these habitats, as significantly more than double the habitat area (for these two vegetation types) likely to be impacted by mining will be conserved within the project area.
6. Suitable high quality areas of Namaqualand Sand Fynbos in the region, adjacent to the Namaqua National Park, have been identified. These could potentially be purchased by the applicant and donated to the appropriate national conservation authorities, or leased to them via contract. This would effectively be a biodiversity offset that would help reduce the significant residual botanical impacts remaining after all the above mitigation has been factored in (Moderate – High negative). Approximately 9000ha of suitable land has been identified, made up of 11 cadastres, in three main areas (see Figure 7-2). It is recommended that 2500ha of this would be required to offset all biodiversity impacts to either moderate or low. It is recommended that consideration be given to purchasing suitable portions and donating them to the Park, within five years of project approval. Given that there are numerous factors that may impact on what land is actually purchased (including landowner willingness) no recommendation is made at this stage in terms of which portions have to be purchased, but it should be within either of these three target areas. If this quantum of land can be added to the National Park then the overall significance of the loss of Sand Fynbos for this project could be reduced to LOW negative.
7. There must be a north-south corridor at least 300 m wide through the project area at all times. This corridor will be along the eastern side of Roode Heuvel during years 1-5 of mining and along the western edge of the project site once rehabilitation has been completed, for the remainder of the mine life. This corridor is particularly important in the case of the primary target habitat – Namaqualand Sand Fynbos. This vegetation type has a north – south regional distribution, through the western half of the study area (mainly on Roode Heuvel), and it is part of a largely continuous strip of habitat that runs from northeast of Hondeklipbaai in the north to the Olifants River in the south. Complete severance of this currently largely intact habitat through open cast mining across its width is not desirable from an ecological perspective (Desmet & Helme 2009). The corridors need to be of sufficient width to allow the potential natural movement of most faunal and plant species, and the wider the better in terms of functionality. The corridor will also function as a vital repository of rehabilitation material (seeds) for the post mining phase. This will significantly enhance rehabilitation success, and

will also help limit wind erosion. A large part of the Sand Fynbos in the area also occurs on the property to the west of Roode Heuvel, owned by and currently being prospected by Exxaro, which suggests that mining may take place here at some stage in the future, severely compromising the corridor potential in the region. It is thus essential that both operations take corridors into account on their own land in order to avoid total loss of the north – south link in this area. The position, shape and extent of the corridor/s are fairly flexible, but need to be worked into mine planning.

8. A significant buffer should be maintained along the part of the study area that borders the existing edge of the Namaqua National Park (northwestern corner of Roode Heuvel). Ideally this should be at least 5000m wide, and wider according to the Mining and Biodiversity Guidelines; but in reality this is not likely to be more than 3200m. This could serve a triple purpose as the main north – south ecological corridor, and would also conserve a large part of the northern Sand Fynbos area with at least 15 plant SCC.
9. Primary processing takes place on or near site and involves washing with seawater. This will lead to a significant increase in the salinity of the soil returned to the areas requiring rehabilitation. This will compromise the rehabilitation potential of Namaqualand Sand Fynbos (Desmet & Helme 2003), which prefers acidic soils. Studies at Namakwa Sands have found that high soil salinity poses a challenge during rehabilitation (reducing species diversity), especially if rainfall is below average (and natural leaching is thus reduced). It is therefore recommended that topsoil of at least 300mm depth (0.3m) be set aside for rehabilitation purposes, as this will then retain its original pH, and will also include the bulk of the soil stored seedbank (including most of the bulbs, which are more deeply buried than most of the seeds). Furthermore, the top 2 metres of tailings returned to the surface after mining must be sand tailings only, as any clay will assist in the retention of salt.
10. All livestock should be removed from the total authorized mining area and a 500m buffer area around it (except where this is not feasible due to land ownership) from six months after any initial authorisation, throughout the life of the mine, and for at least ten (10) years after primary rehabilitation is completed on any particular block. Livestock preferentially eat the most tender flowering parts (including seeds), and also target annuals, such as grasses and herbs. The latter are often pioneers, which would normally be the first to stabilize a disturbed area and provide habitat for the longer lived shrubs. Thus, by removing livestock one maximizes the available seed bank, and hence the rehabilitation potential. It is the cheapest and easiest way of enhancing rehabilitation success.
11. Livestock should, for the same reason, also be removed from the total project area (which will presumably be owned by the applicant) for the entire life of mine.
12. The coastal seawater intake should be located at either Gulley Intakes 2, 6 or 7, which are of the lowest sensitivity and do not support any plant SCC. If neither of these is suitable for any reason there are also many potentially suitable gulleys with low sensitivity adjacent vegetation just north of Island Point (Gulley Intake Kmm5), and the botanist can advise on these. Intake site Kmm4 does support a population of a single plant SCC, but the area has good rehabilitation potential and could be considered for development. Intake sites 1 and 3 contain high sensitivity botanical elements and should not be further considered.
13. The seawater pipeline should be an above ground pipeline if possible, as this entails significantly less disturbance than an underground pipeline. Frequent crossing zones should be incorporated to allow stock and wildlife movement. At this stage the exact route of the pipeline is not known and thus no further mitigation can be suggested.
14. Botanical input into the mine EMP is required, and specifically in terms of site rehabilitation and management of the surrounding areas that will not be developed.



15. All additional mitigation requirements (such as Search and Rescue for certain SCC, and alien invasive vegetation management) noted in Section 7 should be considered mandatory, as they are considered reasonable and feasible, and have been factored into the assessments.

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## 10. APPENDIX 1: LIST OF PLANT SPECIES RECORDED AT ROODE HEUWEL

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
<i>Acanthopsis carduifolia</i>						
<i>Adenogramma mollugo</i>						
<b>Agathosma elata</b>						EN
<i>Albuca grandis</i>						
<i>Albuca secunda</i>						
<b>Aloe krapohlina</b>						DDD
<i>Amphibolia laevis</i>						
<i>Amphiglossa tomentosa</i>						
<i>Antimima</i> sp						
<i>Arctotis decurrens</i>						
<b>Arctotis sp nov 1.(perennial, orange)</b>						STBA
<i>Arctotis</i> sp nov 2 ( <i>rubrosabulosa</i> MS)						
<b>Argyrolobium velutinum</b>						EN
<b>Aspalathus albens</b>						VU
<i>Aspalathus cuspidata</i>						
<i>Aspalathus quinquefolius</i>						
<i>Aspalathus spinescens</i> ssp <i>lepida</i>						
<i>Asparagus aethiopicus</i>						
<i>Asparagus alopecurus</i>						
<i>Asparagus capensis</i>						
<i>Asparagus exuvialis</i>						
<i>Asparagus rubicundus</i>						
<i>Babiana brachystachys</i>						
<i>Babiana confusa</i>						
<i>Babiana grandiflora</i>						
<i>Babiana hirsuta</i>						
<i>Babiana sinuata</i>						
<i>Berkheya fruticosa</i>						
<i>Boophone haemanthoides</i>						
<i>Brassica tournefortii</i>						

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
Brownanthus sp						
Brunsvigia bosmaniae						
Calobota angustifolia						
<b>Caesia sabulosa</b>						VU
<b>Calobota lotononoides</b>						NT
Calobota sericea						
Cephallophyllum aff framesii						
<b>Cheiridopsis sp nov</b>						STBA
Chlorophytum viscosum						
Chrysocoma longifolia						
Chrysocoma ciliata						
Chrysocoma sp						
Cissampelos capensis						
Cladoraphis cyperoides						
Cleretum bellidiformis						
Cleretum rourkei						
Cliffortia juniperina						
Cliffortia teretifolia						
Clutia daphnoides						
Clutia aff polifolia						
Conicosia elongata						
Conicosia pugioniformis						
Conophytum pageae						
Corycium crispum						
Cotula thunbergii						
Cotyledon orbiculata						
Crassula deceptor						
Crassula expansa						
Crassula muscosa						
Crassula nudicaulis						
Cyanella orchidiformis						
Cytinus sanguineus						
Dicrocaulon ramulosum						

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
Dicrocaulon sp 1						
Dicrocaulon sp 2						
Didelta carnosus						
Dimorpotheca pinnata						
Dimorpotheca pluvialis						
Dimorpotheca tragus						
Diosma ramosissima						
Diospyros austro-africana						
Dischisma spicata						
Drosanthemum sp						
Drosanthemum salicola						
Ehrharta barbinodis						
Ehrharta calycina						
<b>Elegia sp nov</b>						STBA
Elytropappus rhinocerotis						
Eriocephalus africanus var paniculatus						
Eriocephalus racemosus						
<b>Eriospermum arenosum</b>						VU
Eriospermum paradoxum						
Eriospermum sp						
Euclea tomentosa						
Euphorbia burmanii						
Euphorbia caputmedusae						
Euphorbia tenax						
Euphorbia tuberosa						
Euryops tenuissimus						
Felicia australis						
Felicia dregei						
Felicia filifolia						
Felicia hyssopifolia						
Ferraria flava						
Ficinia argyropa						
Ficinia deusta						

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
<i>Ficinia indica</i>						
<i>Frankenia pulverulenta</i>						
<i>Galenia africana</i>						
<i>Galenia fruticosa</i>						
<i>Galenia sarcophylla</i>						
<i>Galium capense</i>						
<i>Gazania tenuifolia</i>						
<i>Gethyllis britteniana</i>						
<i>Gethyllis ciliaris</i>						
<i>Gladiolus carinatus</i>						
<i>Gloveria integrifolia</i>						
<i>Gnidia clavata</i>						
<i>Grielum grandiflorum</i>						
<i>Grielum humifusum</i>						
<i>Gymnosporia buxifolia</i>						
<i>Hebebstreitia cordata</i>						
<i>Hebensreitia</i> sp						
<b>Helichrysum dunense</b>						VU
<b>Helichrysum tricostatum</b>						NT
<i>Helichrysum</i> sp						
<i>Heliophila cornuta</i>						
<i>Heliophila crithmifolia</i>						
<i>Heliophila juncea</i>						
<i>Heliophila</i> sp						
<i>Hermannia cuneifolia</i>						
<i>Hermannia heterophylla</i>						
<i>Hermannia scordifolia</i>						
<b>Hermannia sp nov</b>						STBA
<i>Hermannia trifurca</i>						
<i>Hessea pilosula</i>						
<i>Hirpicium alienatum</i>						
<i>Hoplophyllum spinosum</i>						
<i>Hyobanche glabrata</i>						



Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
<i>Hypertelis angrae pequenae</i>						
<i>Indigofera meyeriana</i>						
<i>Isolepis</i> sp						
<b>Jacobsenia sp nov</b>						STBA
<i>Jordaaniella cuprea</i>						
<i>Jordaaniella spongiosa</i>						
<i>Justicia cuneata</i>						
<i>Kedrostis psammophila</i>						
<i>Lachenalia anguinea</i>						
<i>Lachenalia mutabilis</i>						
<i>Lachenalia punctata</i>						
<i>Lachenalia splendida</i>						
<b>Lachenalia sp nov</b>						STBA
<i>Lachenalia undulata</i>						
<b>Lampranthus procumbens</b>						VU
<i>Lampranthus stipulaceus</i>						
<i>Lapeirousia arenicola</i>						
<i>Lebeckia ambigua</i>						
<i>Leucadendron brunioides</i> ssp <i>brunioides</i>						
<b>Leucoptera nodosa</b>						VU
<b>Leucospermum rodolentum</b>						VU
<i>Limeum africanum</i>						
<i>Limeum fenestratum</i>						
<i>Limonium</i> sp nov ( <i>dagmarae</i> MS)						
<i>Lobostemon cinereus</i>						
<i>Lotononis</i> sp						
<i>Lycium strandveldense</i>						
<i>Lyperia tristis</i>						
<i>Manulea altissima</i>						
<i>Melianthus elongatus</i>						
<i>Mesembryanthemum crystallinum</i>						
<i>Mesembryanthemum rapaceum</i>						
<b>Metalasia adunca</b>						NT

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
<i>Metalasia densa</i>						
<i>Microloma sagittatum</i>						
<i>Mollugo cerviana</i>						
<i>Mollugo pusilla</i>						
<i>Monechma spartioides</i>						
<i>Monilaria chrysoleuca</i>						
<i>Monsonia spinosa</i>						
<b>Muraltia obovata</b>						VU
<i>Muraltia spinosa</i>						
<i>Nemesia anisocarpa</i>						
<i>Nemesia ligulata</i>						
<i>Nenax arenicola</i>						
<i>Nestlera biennis</i>						
<i>Odyssea paucinervis</i>						
<b>Oncosiphon schlechteri</b>						EN
<i>Oncosiphon suffruticosus</i>						
<i>Ornithogalum multifolium</i>						
<i>Ornithoglossum viride</i>						
<i>Osteospermum grandiflorum</i>						
<i>Osteospermum incanum</i>						
<i>Othonna</i> aff. <i>Hederifolia</i>						
<i>Othonna arbuscula</i>						
<i>Othonna coronopifolia</i>						
<i>Othonna cuneata</i>						
<i>Othonna cylindrica</i>						
<b><i>Othonna lepidocaulis</i></b>						Rare
<i>Othonna leptodactyla</i>						
<i>Othonna retrofracta</i>						
<i>Othonna sedifolia</i>						
<i>Othonna undulosa</i>						
<i>Oxalis flava</i>						
<i>Oxalis gracilis</i>						
<i>Oxalis hirta</i>						

Species	Namaqualand Sand Fynbos	Namaqualand Strandveld	Hardeveld	Coastal fringe	Only seen in proposed mining area	Red List Status
<i>Oxalis purpurea</i>						
<b><i>Pelargonium caroli-henrici</i></b>						Rare
<i>Pelargonium fulgidum</i>						
<i>Pelargonium gibbosum</i>						
<i>Pelargonium senecioides</i>						
<i>Pelargonium triste</i>						
<i>Pharnaceum lanatum</i>						
<i>Pharnaceum microphyllum</i>						
<i>Phylla sp</i>						
<i>Phyllobolus sp</i>						
<b><i>Phyllobolus tenuiflorus</i></b>						VU
<i>Phyllopodium pumilum</i>						
<i>Psammotropha quadrangularis</i>						
<i>Psilocaulon sp</i>						
<i>Pteronia divaricata</i>						
<i>Pteronia onobromoides</i>						
<i>Pteronia ovalifolia</i>						
<i>Pteronia pallens</i>						
<i>Restio macer</i>						
<i>Rhynchosidium pumilum</i>						
<i>Romulea tabularis</i>						
<i>Ruschia fugitans</i>						
<i>Ruschia goodiae</i>						
<i>Ruschia small fls</i>						
<i>Ruschia subpaniculata</i>						
<i>Ruschiella lunulata</i>						
<i>Salvia africana lutea</i>						
<i>Salvia lanceolata</i>						
<i>Searsia leavigata</i>						
<i>Searsia longispina</i>						
<i>Selago</i>						
<i>Senecio alooides</i>						
<i>Senecio arenarius</i>						