

**ABRUS ENVIRONMENTAL
CONSULTANCY**

Harold Braack

**P.O. Box 2189
Thabazimbi 0380
South Africa**

**Telephone: (014) 777 6911
(072) 599 7267
(082) 376 0248**

e-mail: harold@bushacademy.com

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**REPORT ON A SURVEY OF HERPETOFAUNA
on the**

Proposed Prospecting Site: Haenertsburg
Parts of Farms Paeroa 1083 LS, Paardevlei 201 KS (portion 1) and Colberg 1169 LS.
QDGC 2329Dd

1. INTRODUCTION

This survey was proposed as part of the basic assessment for the Ndwana advanced prospecting programme of the cultural and natural elements which comprise the proposed prospecting site, and to assess the potential impact of the prospecting activities, particularly where sensitive areas or species are involved.

2. PROSPECTING PROJECT DESCRIPTION

Ndwana Exploration Two (Pty) Ltd, a joint venture between Mvelaphanda Resources (Pty) Ltd. and De Beers Consolidated Mines Limited has been carrying out prospecting in the Haenertsburg area based on an authorisation (a Prospecting Right and an Environmental Management Plan, EMPLan) issued by the Department: Minerals and Energy (DME) in terms of the Mineral and Petroleum Resources Development Act and related regulations on 25 January 2007. This work is ongoing.

Prospecting follows a phased approach and is driven by the results of each preceding phase. The initial prospecting results indicated that it was necessary to go into the next phase on a much smaller area. This 57ha area includes parts of the farms Paeroa 1083 LS, Paardevlei 201 KS (portion 1) and Colberg 1169 LS. Locality maps are indicated in the Basic Assessment Report.

One of the conditions of the original EMPLan was that if further prospecting activities were necessary in the areas identified as "sensitive areas" then a more detailed environmental assessment (Basic Assessment) would be carried out for these areas. The assessment that is now being conducted is in line with this commitment. Where the manual pitting or narrow diameter drilling are necessary in areas not identified as "sensitive areas", they will proceed. The majority of stakeholders are familiar with the EIA regulations, promulgated in terms of Section 5(54) of the National Environmental Management (NEMA) Act No. 107 of 1998 and it therefore seemed best practice to use this process, whilst still meeting the requirements of DME. (There is currently a Memorandum of Agreement between DME and the Department of Environmental Affairs and Tourism (DEAT) on this issue.) In terms of the "Listed Activities" in the regulations, a Basic Assessment EIA is necessary for the activities envisaged and the Limpopo Department of Economic Development, Environment and Tourism have been consulted in this regard (Ref. 12/1/9/N-C224).

This second phase of prospecting aims firstly to define the extent of the kimberlite(s) and then establish whether the size and grade warrant going on to the final phase of prospecting. If the size and grade specifications are not met, the prospecting project will probably stop at this point. If they do meet requirements, the final phase, which is bulk sampling, will commence following a scoping and full EIA (**Update:** the current NEMA regs out for comment specify that all prospecting operations will require a Basic Assessment, and Mining will necessitate a Scoping and full EIA. These are not yet finalized.) and only then, if the deposit(s) warrants mining, there will be an EIA conducted to convert the prospecting right to a mining right. Both these steps will involve the required public participation. The proposed prospecting outlined here will offer limited part-time employment to a small number of persons living nearby.

The three properties fall within the Lepelle-Nkumpi Local Municipality but as access is via Haenertsburg which falls in the Greater Tzaneen Local Municipality, both local municipalities have been involved in the process and have had the opportunity to raise any concerns.

The study area straddles the contact between the granite-gneiss and older rocks on the northern lower part of the site and the quartzite and shale dominated rocks of the southern higher lying upper part of the site. The escarpment is incised by Letaba and Olifant's River tributaries. The vegetation, reflective of the geology and soils, consists of the Northern escarpment quartzite sourveld (Gm 23) and Woodbush granite grassland (Gm 25) by Musina *et al* (2006). The habitat, which lies between 1600 and 1960m is dominated by a steep rocky scarp face below which are moist grasslands and exotic plantations. The drainage lines are wooded while the plateau on the summit is dominated by Proteaceous woodland and moist grassland on quartzites.

The proposed prospecting activities include shallow manual pitting (90 pits – 45 on each of the sites – 1m x 1m up to 2m deep, 1m of disturbance allowed around the edge so footprint for each given as 9m²), the drilling of 20 narrow diameter drill holes by a modular, man-portable drill rig and mini bulk sampling done in one of two ways, or a combination of each, namely 12 large diameter boreholes and 4 mechanised pits (6 drill holes and 2 pits on each site). A footpath of 600m is envisaged on the upper site, and an overall extension of the existing tracks by about 1km to facilitate access to sites. The details of the total footprints for each activity, the use of vehicles, use of water and approximate time frames are given in a table in the Basic Assessment Report. It is estimated that the total time for this phase of prospecting, including the times of inactivity when results are awaited from the laboratory, will be two years. The prospecting will provide 12 – 20 persons from the area with short term contract work. Workers will be transported out to the site each day and will not overnight on site. The access routes to be used are indicated on the infrastructure maps in the Basic Assessment Report.

Waste generated will include a limited number of empty fuel drums, oil and grease cans, general waste from lunch food, possibly wire, cables, collected hydrocarbon contaminated soil, some recycled water and silt from the drilling. The silt from drilling will have the hydrocarbon skimmed off for disposal as hazardous waste and then be used in the bentonite for grouting the drill holes. The contractor will provide portable toilets, using an environmentally friendly reagent which will be emptied regularly and disposed of at a water treatment works. Waste management will be according to the De Beers Waste Management procedure which is part of their ISO14001 certified environmental management system. The methods of rehabilitation will be specified in the amended EMPlan. The water used in the drilling programmes will not be obtained from site, unless this arrangement is made with the landowner, but will be sourced from a registered water provider. The total quantity of water required is in the region of 920m³.

3. TERMS OF REFERENCE

The herpetological study needed to determine what impacts or potential impacts the identified prospecting activities could have on the reptiles and amphibians on the site, on the conservation status and the biodiversity, as well as what mitigatory measures would be appropriate should this prospecting be authorised to go ahead.

For ease of assessment and reporting, the above brief was categorised as:

- a. to report on the herpetofauna found at the proposed prospecting site during the survey,
- b. to assess the herpetological significance of the site,
- c. to assess the potential impact of proposed prospecting methods on herpetofauna, their habitat and their conservation status,
- d. to suggest mitigatory measures where these may be needed.

4. METHODOLOGY

Site Identification: The site and its boundaries were identified and shown by Simon Mabolani (Project Geologist) on 13 November, 2008.

Figure 1. The Site.



Date of Survey: The physical on-site survey of herpetofauna and their habitats took place on 13 and 14 November, 2008. Literature surveys (Alexander and Marais 2007, Branch 1998, Marais 2004, Minter et al 2004, various journals) were conducted prior to visiting the site. Contact was made with Clayton Cook, who had done a survey of the general area in April, 2008, with Marius Burger, to obtain their results.

For surveying of the site, the area was divided into four broad habitat types:

- a. *Protea* grassland (which included montane grassland and rocky slopes);
- b. Mixed *Acacia* indigenous scrub/woodland;
- c. Plantation;
- d. Cleared (felled) plantation

For the final analysis of impact and mitigation, the vegetation map of the prospecting site provided by the botanist (Pieter Winter – attached Figure 4) was used.

The habitats were strip/transect surveyed as far as possible, though the denseness of the mixed *Acacia* woodland made it difficult to maintain evenly spaced transects. While walking the strips, movement was observed, rocks and logs were lifted and searched under, leaf litter was scratched and sifted, grass tussocks were searched, and exposed rocks and logs were checked for basking animals. Cracks in rocks, and gaps between rocks, were investigated.

Some priority was given to the *Protea* grassland, particularly the rocky slopes, because of its herpetological significance as a special habitat, and the relatively undisturbed nature of the terrain.

Good rains which had recently fallen in the area meant that reptiles and frogs were most likely to be active and that the timing of the survey was good. This was enhanced by the emergence of alate termites at the time of the survey. Weather conditions (mist, heavy rain) at the time of the survey, however, made surveying difficult at times, and dangerous on the slopes. Rain precluded the use of pitfall traps or drift fences.

Night drives were undertaken in surrounding areas to assess species and enable comparisons. Again, because of fairly heavy rain and mist, these were not very successful in terms of assessing overall herpetofauna emergence and diversity.

A wetland and pond just outside, below, the site were also investigated.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

Results of the survey are presented according to the listed purposes (above, under terms of reference) of the study:

a) Herpetofauna found at the site

A total of fourteen (14) species of herpetofauna were recorded on the prospecting site during this survey, as listed below and separated into different habitats:

- | | | |
|----|---|-------------------------------|
| a) | Protea grassland | |
| | <i>Trachylepis varia</i> | Variable Skink |
| | <i>Trachylepis striata</i> | Striped Skink |
| | <i>Scelotes mirus</i> | Montane Dwarf Burrowing Skink |
| | <i>Chamaesaura aenea</i> | Transvaal Grass Lizard |
| | <i>Lygodactylus methueni</i> (SARDB Vulnerable) | Methuen's Dwarf Gecko |
| | <i>Gerrhosaurus flavigularis</i> ?? | Yellow-throated Plated Lizard |
| | * <i>Tetradactylus</i> sp ?? | Long-tailed Seps |
| | <i>Psammophylax rhombeatus</i> | Rhombic Skaapsteker |
| | <i>Bitis atropos</i> | Berg Adder |
| b) | Mixed Acacia scrub/woodland | |
| | <i>Bradypodion transvaalense</i> | Transvaal Dwarf Chameleon |
| | <i>Lygodactylus capensis</i> | Cape Dwarf Gecko |
| | <i>Dispholidus t. typus</i> | Boomslang |
| c) | Plantation | |
| | <i>Amietophrynus gutturalis</i> | Guttural Toad |
| d) | Felled plantation | |
| | <i>Lygodactylus capensis</i> | Cape Dwarf Gecko |
| | <i>Trachylepis striata</i> | Striped Skink |

Trachylepis varia
Bitis a. arietans

Variable Skink
 Puff Adder

Wetland and pond immediately below, but outside of, prospecting site:

Cacosternum boettgeri
Xenopus laevis

Boettger's Dainty Frog
 Common Platanna

Comment: ?? indicates uncertainty as these were seen, but were too quick to catch or view sufficiently to make positive identification.

* This will be considered below, under **b**.

Unless conducted over a lengthy period of time, which may extend over years, few surveys of herpetofauna can be considered totally complete. What needs to be gauged along with the site-recorded species are the availability of habitats structurally similar to on-site habitat and their accessibility, and the proximity of surrounding feeder populations of herpetofauna and their ability to access and traverse/inhabit the site. Habitats adjoining the proposed prospecting site are structurally similar to those on site, and should easily enable access to feeder populations for establishment and traversing.

The list presented above is almost certainly not a complete list. It does, however, give fair representation to both rare and common species, and can be considered adequate for the purposes of this assessment.

b. Herpetological significance of site

The proposed prospecting site forms part of a much broader landscape, and is closely allied to the Wolkberg centre of endemism. Much of this original landscape has been altered, particularly through the establishment of plantations – any remaining pristine habitat assumes a new and increased significance.

Within the proposed prospecting area, both this survey and that of Cook and Burger (C. Cook, pers. comm.) revealed a number of interesting reptile species which are habitat specific. The records of Red Data listed species such as *Lygodactylus methueni* (this survey) and *Lamprophis swazicus* (Cook/Burger survey) are of interest, but are not unexpected, and both species were found in adjacent areas. However, the visual record of what appears to be *Tetradactylus* is of especial interest - this may be a species currently thought to be extinct, *Tetradactylus eastwoodae*, known only from collection in 1913 in the Woodbush Forest. Additional surveys would be required to confirm the presence of this species.

As indicated above, under Methodology, the site was divided into four habitat types for survey purposes. The lower habitats which have to a large degree been disturbed or altered, are of no current herpetological significance. However, the *Protea* grassland is of herpetological significance because of the presence of Red Data species and high levels of adaptive evolution to this habitat; of most significance are the rocky, quartzite grassland slopes (vegetation types 6 (Boulder Scrub) and 7 (Scarp Community) in the vegetation map (Figure 4) provided by Winter) on the northern aspects of the *Protea* grassland (see Figures 2 and 3) where the sightings of possible

Tetradactylus sp. were made, and Red Data listed species (*Lygodactylus methueni*) were recorded.

c. Assess potential impact of proposed prospecting methods

From an herpetological perspective, the impact of prospecting activities is of significance only in the *Protea* grassland habitats (vegetation types 9 and 10) and those of vegetation types 6 and 7 (Boulder Scrub and Scarp Community – see Figure 4), and will in these habitats require close management. The lower *Acacia* woodland, plantation and grassland habitats are extensively represented in adjoining areas – prospecting in these habitats will not pose a threat to the overall habitat or species composition, unless there is a spill-over effect on to other habitats.

The high sensitivity of the Boulder Scrub and Scarp Community habitats is principally associated with the boulder strewn, dense grassland structure on a fairly steep gradient with northerly aspect (high insolation). Mist is an important factor in this regime. All of this presents a highly specialised habitat for reptiles (see Figures 2 and 3), as illustrated by the species recorded there. Only a small area of the total proposed prospecting site is covered by this particular habitat, but this habitat is also only poorly represented elsewhere.

The impact of prospecting on herpetological habitat in the upper vegetation communities (6, 7, 9 and 10 – see Figure 4) is significant only in terms of exposure (removal and altering of vegetation composition and base structure) and compaction (such as by frequent vehicle use). Activities, such as Shallow Manual Pitting or drilling, do not, in themselves, present a problem to the herpetofauna, if the sites are properly reconstituted and rehabilitated.

Current understanding of the conservation status of herpetofauna should not be affected by the currently proposed prospecting activities, unless significant damage is caused to the upper habitats (6, 7, 9 and 10 in the accompanying vegetation map). Should the presence of *Tetradactylus eastwoodae* be confirmed, its Red Listing/conservation status would need to be re-assessed, as would further measures for its protection.

d. Suggest mitigatory measures

As discussed, the lower plantation, grassland and *Acacia* habitats within the proposed prospecting area are not of herpetological significance as they show, at this stage, high levels of disturbance and depauperate herpetofauna communities. Any additional disturbance to these habitats is well mitigated through their (the habitats) extensive representation in adjoining areas.

Special care will need to be taken in the *Protea* grassland habitat. It is suggested that the sites and routes for prospecting and logistical activities are agreed to on site by the project geologist and the botanist, and that steps for progressive habitat reclamation are also agreed to for the sites and access routes. Monitoring of these sites for floristic composition as well as erosion is recommended; intervals and need for continued

monitoring should be determined both by the extent of disturbance and nature of the specific site.

Any disturbance to the Boulder Scrub and Scarp Community habitats should be treated in the same manner as for the *Protea* Grassland habitats.

6. IMPACT ASSESSMENT

The long-term impact of any form of disturbance can realistically be determined with accuracy only after the surrounding areas are surveyed to assess the true extent of suitable habitat, and the distribution of species found within those habitats. In terms of herpetofauna, it is the structure of the habitat and microhabitat which is of significance, and it is that aspect which needs to be managed during prospecting activities and reclamation.

In terms of both the recorded species and their habitat, the areas that have here, on the proposed prospecting site, been degraded through forestry activities, as well as the mixed indigenous *Acacia* scrub/woodland and the somewhat degraded Woodbush Granite Grassland, are not of current herpetological significance - the species recorded there are generally common, and that habitat is broadly replicated in adjoining areas. From an herpetological point of view, these areas do not present a problem in terms of the present scope of prospecting.

Sensitive areas are the *Protea* grassland (vegetation types 9 and 10 – see fig 4) represented on the upper altitudes of the site, and, in particular, the rocky slopes above the level of the fire lookout hut on site are of concern (vegetation types 6 and 7 – see fig 4).

From the point of view of the purpose of the survey, it is not possible to give one broad assessment which covers the entire site: the Boulder Scrub and Scarp Community habitats should be considered as highly sensitive and as a unit separate from the other habitats of the prospecting site. In terms of the most recent (30 August, 2008) correspondence from the Senior Project Manager (Notes Regarding Table 1b), it seems that these two habitats may not be impacted on by prospecting or further prospecting.

In broad terms: the impact of proposed prospecting and logistic activity on the lower region of the site (on the farm Paeroa 1083LS) is of little immediate significance; the impact of proposed prospecting and logistic activity on the upper region of the site (on the farm Paardevlei 201KS) could be of high significance and needs close management, particularly in consultation with the botanist.

7. RECOMMENDATIONS

On the basis of this survey and the assessment of habitats and herpetofauna found during the survey, it is recommended that:

- a. Prospecting and associated logistical activities, as proposed (updated Table 1b), continue on the lower altitude sites of the farm Paeroa 1083LS.

- b. Prospecting and associated logistical activities, as proposed (updated Table 1b),
continue on the higher altitude sites of the farm Paardevlei 201KS; however, the placement of the prospecting and logistic sites and routes on this upper habitat should be done in consultation with the project geologist and a botanist.
- c. A botanist should have input into the procedures and methods for rehabilitation of prospecting and logistic sites and routes
- d. All important species of herpetofauna found during prospecting activities on the Paardevlei sites be photographed and then released as near as possible to the site of encounter. The photographs should be made available to the herpetologist as soon as possible. Photographs of the important herpetofauna will be provided by the herpetologist to assist the geologist/project staff in identifying these species.
- e. Access to the Boulder Scrub and Scarp Community habitats be granted to the herpetologist and assistants to verify the presence or absence of *Tetradactylus eastwoodae* through additional survey. Such visit would be arranged with the Senior Project Manager.

Figure 2. The rocky grassland slope habitat.



Figure 3. The rocky grassland slope habitat, close view.



The above recommendations apply to the specific activities listed in Table 1b: “Updated Details of Proposed Prospecting Activities” (30 August, 2008), where currently applicable (Activities 3, 4, and 6).

6. ACKNOWLEDGEMENTS

I thank Mr Simon Mabolani for pointing out the site and its boundaries, and for on-site discussions. Dr Clayton Cook has exhibited remarkable keenness to assist in finding species, for which I am grateful, particularly with regard to the possible *Tetradactylus* sp. Mrs Jan Phelan and Mr Andrew Macdonald (Senior Project Manager) are thanked for the opportunity to do the survey and report.

Figure 4. Vegetation Map of the Ndwana Exploration EIA Study Area showing the most important herpetofauna habitats (after Pieter Winter, 2008)

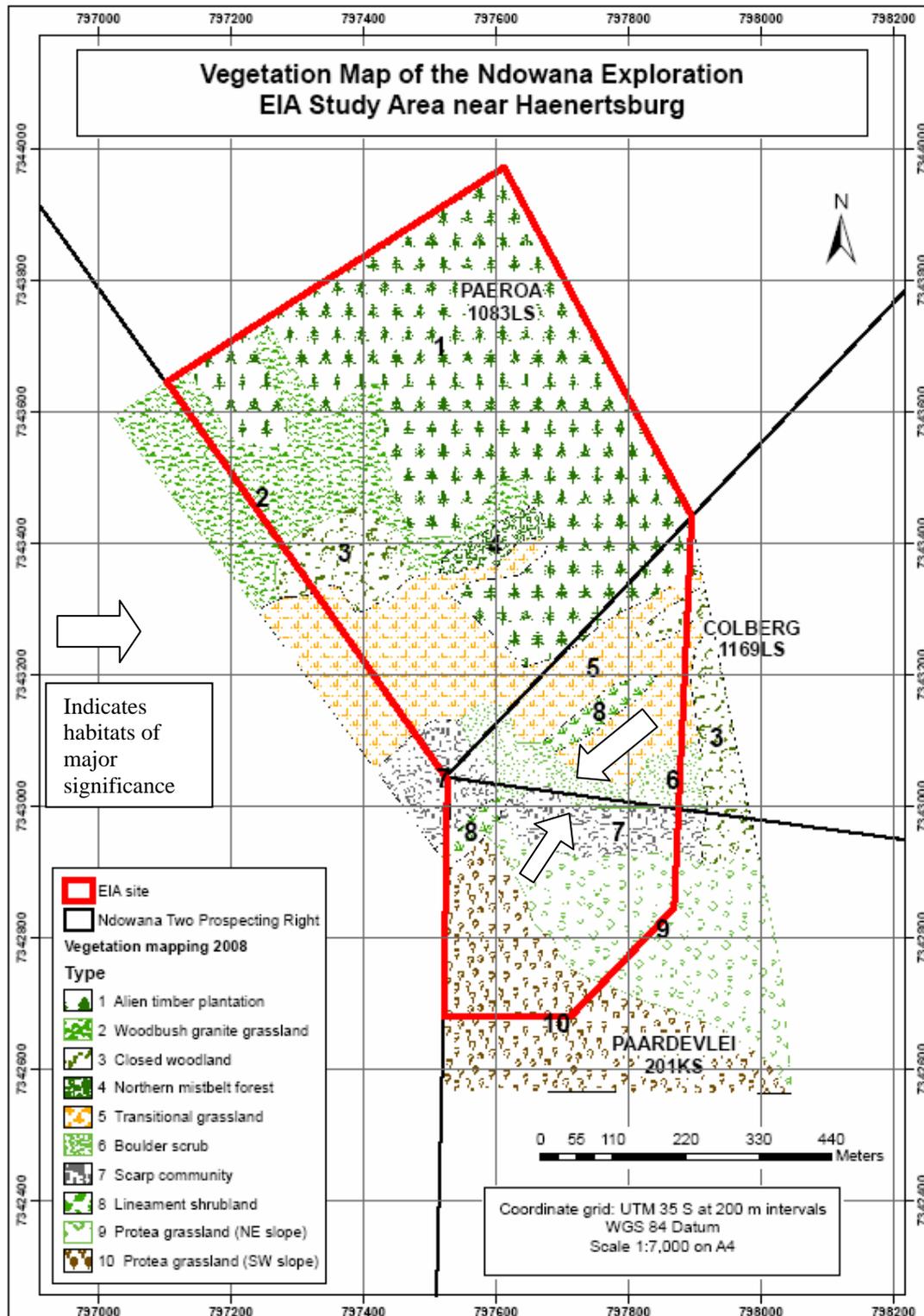


Table 1: Assessment of Significance of the Impacts of the Proposed Advanced Prospecting Programme on Herpetofauna.

Assessment of Significance of Impacts	
Duration / Sensitivity	5 = Permanent (irreplacable or irreversible), 4 = Long term, 3 = Medium term, 2 = Short term or intermittent, 1 = negligible
Extent	5 = impact extends significantly beyond the area of activity, 3 = impacts extends beyond the area of activity, 1 = impact only at area of activity
Probability	10 = definite (where the impact will occur regardless of any prevention measure), 7 = highly probable (where it is most likely that the impact will occur) 5 = probable (where there is a distinct possibility that the impact will occur), 1 = improbable

Discretion may be used to assign values between these ones defined above.

Any aspect rated at 64% and above is considered to be significant

ACTIVITY of concern	ASPECT of the activity which interacts with the environment	IMPACT	SEVERITY = Duration + Extent		SEVERITY	PROBABILITY	SIGNIFICANCE = Severity x Probability	MITIGATION List Mitigation in Place at the Time of Rating or Proposed Mitigation for second rating (i.e. The rating is based on the mitigation listed in this column being in place)
			Duration / Sensitivity	Extent				
For this assessment only the sensitive habitats above the level of the fire lookout hut are considered. The lower non-sensitive areas are not assessed herein.								
3. Small diameter core drilling	See Note: Any form of alteration or disturbance to the habitat structure	See Note: Alteration of habitat structure will make specially adapted species highly vulnerable to predation, and reduce ability to capture prey.	3	1	4	10	40	In the determination of Severity, it is assumed that mitigation measures will be in place in the sensitive areas by the time of activity: that prospecting sites will have been placed in consultation with the botanist; that rehabilitation of the sites to their original vegetative structure will happen; that the return of features (e.g. rocks) to resemble original condition will be effected. On this basis, it is assumed that conditions will be "natural" again after two or three growth seasons (hence medium term).
4. Access road creation			3	1	4	10	40	
5. Large diameter drilling			3	1	4	10	40	
6. Mini bulk sampling			3	1	4	10	40	
(All activities associated with above)								

Consider in rating of duration / sensitivity and extent	For pollution - consider toxicity, volume and the nature of the substance
	For habitat disturbance - consider the sensitivity of the environment, the area affected and the speed of rehabilitation
	For biodiversity impact - consider the red data rating of the species and the range of the species.
	For resource use – amount of resource used, resource availability and whether it is renewable or not.

Note: All species within the genera *Tetradactylus* (Long-tailed Seps) and *Chamaesaura* (Grass Lizards) show a high level of adaptation to survival in long flowing grass (as illustrated in Figures 2 and 3 of report). Their body structure, with reduced limbs and long tail, enables snake-like "swimming" at high speed through the grass, making the capture of prey and evasion of predators possible. They are not as mobile on gravel or sandy surfaces, or in other vegetative structures. Grass tussocks and stones are used as refuges. Alteration of the vegetation structure and basal feature would have a pronounced effect on the ability of these animals to survive.

Table 2: Details on Any Recommended / Suggested Mitigation and Monitoring (to feed into the EM Plan)

MITIGATION : Disturbance to the structure of the habitat during manual pitting or any of the other activities. This particular mitigation relates to manual pitting on the Upper Site.					
Suggested Mitigation (Description)	Actions / Methods	Timing	Suggested / Recommended Responsibility	Legal Requirements	Costs
1. Site location of the manual pits on the upper site 2. Rehabilitation / reclamation of all pits on upper site.	1. Botanist and Project Geologist visit all possible sites for manual pits on the grid matrix and agree on sites or move accordingly where necessary. 2. Botanist contributes to rehab procedure.	1.Prior to disturbance 2. Rehab requirements set down in EM Plan before disturbance, enacted and monitored.	1.Project Geologist and Botanist	DME only grants closure if there has been adequate rehabilitation according to the commitments in the EM Plan.	As determined by geologist and botanist
MONITORING:					
Indicator	Frequency	Suggested Responsibility			Costs
Disturbance to habitat structure	Annual monitoring of rehabilitation.	Botanist / Project Geologist to ensure third party invited to be present in monitoring / auditing.			Botanist fees