

<b>RHAMNACEAE</b> Scutia myrtina		Cat's Claw/Droog-my-Keel
<b>MALVACEAE</b> Abutilon sonneratianum Hermannia saccifera Grewia occidentalis		Wildemalva Doll's Roses Kruisbessie
<b>ARALIACEAE</b> Cussonia spicata		Kiepersol
<b>PLUMBAGINACEAE</b> Plumbago auriculata		Plumbago
<b>EBENACEAE</b> Euclea undulata		Ghwarrie
<b>OLEACEAE</b> Olea europea		African Olive
<b>SALVADORACEAE</b> Azima tetraantha		Beesting
<b>APOCYNACEAE</b> Carissa bispinosa		Num-num
<b>VERBENACEAE</b> Verbena aristigera	EXOTIC	Moss Verbena
<b>SOLANACEAE</b> Lycium afrum		Kraal Honey-thorn
<b>BIGNONIACEAE</b> Tecoma capensis		Cape Honeysuckle
<b>ASTERACEA</b> Felicia filifolia		Felicia

Table 3: Red List species endemic to narrow ranges within the Amalole District.

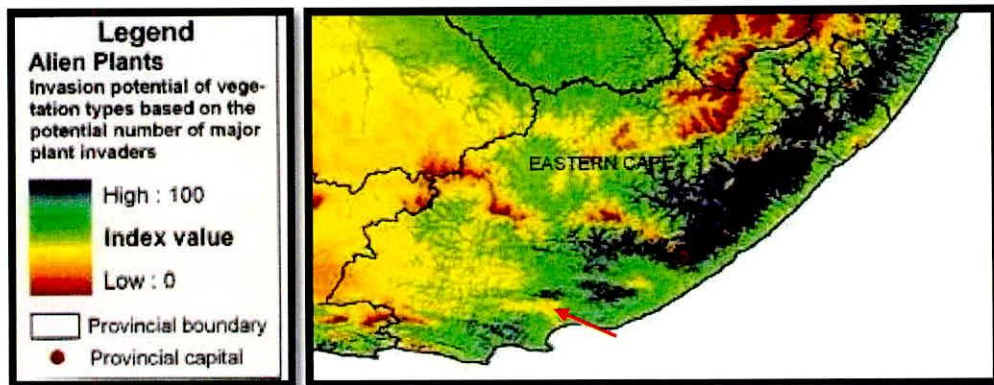
Taxon	Distribution	Status 1	Status 2
<i>Acrodonia kwanensis</i> L. Williams	Coastal area near KwaZulu	K	VU D2
<i>Alephoea multisepta</i> B.L. Burtt	Galla's Kop	NE	Ex
<i>Aloe reynoldsii</i> Lefley	Distribution unclear	V	NE
<i>Aspidoglossum fanaganii</i> (Schltr.) Kupicha	Coastal area near Chalumna R.	V	VU D2
<i>Bauhinia bowkeri</i> Harv.	Restricted to Buttersworth & Umbaba areas	R	NE
<i>Bergeranthus albawangianus</i> A.P. Dold ined.	Seymour	NE	VU D2
<i>Bergeranthus Antbergensis</i> L. Bolus	Tarka to Elliot King Williams Town	K	Rare EN B1ab(i,ii,v)
<i>Brachystelma castrum</i> (Schltr.) N.E.Br.		I	)
<i>Brachystelma franklae</i> N.E.Br. subsp. <i>grandiflorum</i> A.P. East London Dold & Bruyns		NE	VU D2
<i>Brachystelma schoenlandianum</i> Schltr.	Ultenhage	I	Ex
<i>Bulbine frutescens</i> (L.) Willd. var. <i>chalumnaensis</i> Ba[noth] ined.	Chalumna	NE	VU D2
<i>Casipourea fanaganii</i> (Schinz) Aiston	Kompa area.	R	CR A4acd
<i>Ceropegia radicans</i> Schltr. subsp. <i>radicans</i>	Kompa area.	R	VU D2
<i>Ceropegia radicans</i> Schltr. subsp. <i>smithii</i> (M.R. Hend.) R.A. Dyer	Kareera River Bridge	NA	VU D2
<i>Cotyledon orbiculata</i> L. var. <i>fanaganii</i> (Schönland & Baker f.) Toelken	Kel River	R	NT
<i>Crassula planifolia</i> Schönland	Karriani	V	NE
<i>Cynanthus smithiae</i> Walt ex Harv.	Fort Brown only	R	NT
<i>Cynanthus suaveolens</i> Schönland	Pinie	K	EN B1ab(i,ii,v)
<i>Ecotropis alpina</i> N.E.Br.	Amalolas	I	VU D2
<i>Encephalartos cycadifolius</i> (Jacq.) Lehmann	Winterberg	V	LC (Rare)
<i>Encephalartos tridentif- guileimii</i> Lehmann	Calhcart	V	NT
<i>Encephalartos princeps</i> R.A. Dyer	Kel River	V	VU A4acd; C1
<i>Encephalartos trispinosus</i> (Hook.) R.A. Dyer	Fish River	V	VU A4acd; C1
<i>Euphorbia meloformis</i> Aiton subsp. <i>meloformis forma magna</i>	Peddie	NE	VU D2
<i>Euryops citatus</i> B. Nordl.	Katberg	I	VU D2
<i>Euryops gracilipes</i> B. Nordl.	Fish River Valley	K	VU D2
<i>Helichrysum isolepis</i> Bolus	Winterberg	K	LC (Rare)
<i>Indigofera acanthocladia</i> Dinter	Hogsback	K	NE
<i>Isoetes warmsii</i> Sim	Peddie	E	CR D1
<i>Lotononis holosericea</i> (E. Mey.) B.-E. van Wyk	Hogsback	I	NE
<i>Lotononis trichotes</i> (E. Mey.) B.-E. van Wyk	Katberg	K	VU D2
<i>Melanunga galpinii</i> (Boden) Baden	Naihoon Dam	E	EN A3c

The Savanna veld hosts mostly a grass cover with Acacia Karoo dispersed within the grassland and constitutes a non-sensitive component.



Considering that no pristine or sensitive vegetation occurs on the already altered site, the impact can be rated as low.

It is important to upgrade the soil and follow the concurrent rehabilitation plan. The low more rainfall that the area receives would tend to reduce the mentioned impact even further. Wind erosion might cause the re-vegetation process to be more difficult and would necessitate concurrent rehabilitation and the use of organic matter and wind screens, if needed. An alien eradication programme must be implemented from the start, since the potential of alien plant invasion is moderate; the spread of alien tree species is a threat. No fires must be made in this site because run-away fired will destroy the grass land and will cause the re-vegetation process to be even more difficult.



The study area does not constitute a focal point in the landscape and taking the impact of the excavation into consideration, the mining area should be rehabilitated to a better standard as it has been before mining commenced. In following this approach the setting of the area will not be detrimentally affected. Concurrent rehabilitation of the disturbed mine area is important to achieve this goal and adequate time and funding should be devoted to the rehabilitation process. It is imperative that a phased approach be followed to ensure that vegetation disturbance is restricted to the minimum and to set definite targets for the applicant. Poor soil structure might hamper the re-vegetation process hence proper upgrading and protection thereof is not negotiable. Import of additional soil is advised to achieve the above mentioned rehabilitation goals.

From the above analysis it is clear that this vegetation type can withstand some loss through development. Taking into consideration that a very small area will be affected and that this area will be reinstated within the next three years, the impact is rated as low.

**FLORISTIC HOTSPOTS OF SOUTH AFRICA**





**Impact on flora**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Site Specific	Site Specific
<b>Duration</b>	Permanent	Long Term	Medium Term
<b>Intensity</b>	Low-Medium	Low	Low
<b>Probability</b>	Definite	Definite	Likely
<b>Status</b>	Negative	Negative	Negative
<b>Confidence</b>	High	High	High
<b>Significance</b>	Low-Moderate	Low	Very Low

Remedial measures to be implemented are:

In terms of bio-diversity it should be noted that most of the original vegetation was disturbed by previous fluvial deposits. The purpose of the re-vegetation process would therefore not be the reintroduction of the original veld type, but simply the establishment of a proper vegetation cover to stabilize the soil and drainage patterns and to improve the visual and aesthetic acceptability of the disturbed area. With a vigorous re-vegetation programme, certain species might re-colonize rehabilitated areas and the specie composition and diversity will slowly improve but will never revert back to the original status again. The success rate of re-vegetation will however, depends on concurrent rehabilitation and post closure eradication programme being followed.

As pointed out elsewhere, the area displays a secondary vegetation type with a low conservation value and the following general mitigation measures would be implemented:

- Mining will be restricted to the areas demarcated by the mine plans.
- No indigenous vegetation outside the demarcated mine boundaries will be removed.
- All plant species that can be transplanted, if any, will be removed from the mine area, potted and be used during the rehabilitation phase. The necessary monitoring and aftercare will be provided to ensure that any such plants survive.
- All natural vegetative matter removed will be reintroduced into the soil to possibly re-sprout or as mulch to improve soil properties.
- Only the approved haul road will be used and vehicles will not traverse virgin land.
- Disturbed areas will be re-vegetated with a grass cover by seeding with grasses natural to the area.
- Seeding would take place in the spring from October to February at an application rate of 3-5kg/ha of each species. Water obtained from the river can be used to seed areas in winter with barley or lupine to provide an initial surface cover. During spring these areas can be ripped and seeded as indicated above.
- Seed will be broadcasted by hand and areas will be raked over to cover seed and protect it from birds feeding in the area. Seeding, germination and surface cover will be monitored on a continuous basis. This vegetation cover would require the minimum maintenance and within a short time will improve the visual appearance of the site. Maintenance will be carried out until closure has been granted.
- Each phase should reveal a 40% basal cover within the first 12 months, a 70% cover at the end of the two year period and 80-90% cover at the end of the aftercare period.
- Once a groundcover has been established, the following plant species will be introduced to align the texture of the site with that of the surrounds and mask the topographical change brought about by



mining and improve the visuals of the site. For each shrub a planting hole of at least 0,4m x 0,4m x 0,4m deep will be prepared and filled with adequate topsoil and compost and a very light application of 2:3:2. Each hole will be properly watered before planting takes place. For each tree a planting hole of at least 0,5m x 0,5m x 0,7m will be prepared in similar manner.

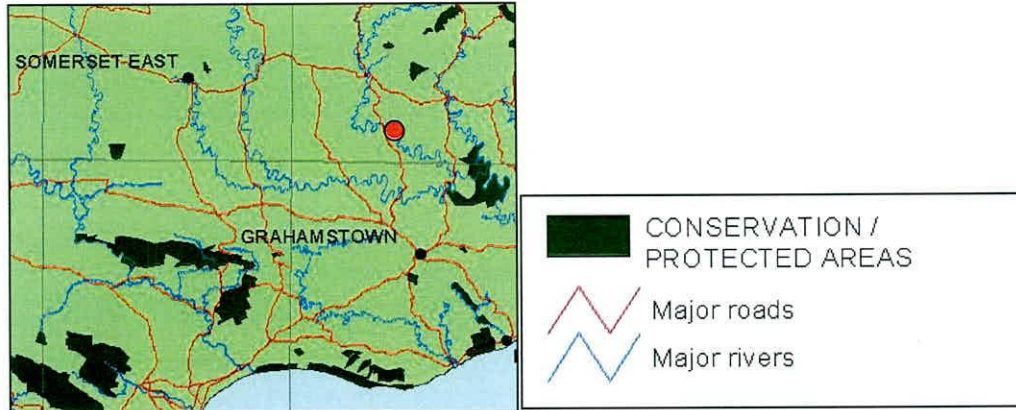
Portulacaria afra	Scotia Afra	Zanthoxylon capense	Rhus species
Pappea capensis	Cussonia spicata	Euclea undulate	Olea europea
Carissa bispinos	Tecoma capensis		

These plants should be planted in clumps in order to provide protection to each other and improve the quality of the rehabilitation process.

- Water for irrigation purposes will be obtained from the river or be trucked in.
- Once the area has been vegetated, a continuous alien control programme will be implemented by pulling any seedlings on a weekly basis with specific emphasis on *Acacia mearnsii*, *Acacia longifolia*, *Acacia saligna*, *Rucinus comunis*, *Lantana camara* and *Solanum* species. No alien tree/shrub will be left until it reaches seed bearing age.
- Once an area is vegetated, no traffic will be permitted in such area.
- Veld fires will be prevented since it could affect the vegetation and grazing capacity of the farm, as well the abutting farms and in the process impact on soil stability and land use. Fires will only be permitted on bare soil in a designated area and appropriate appliances. Fire extinguishers will be made available within the office and cabin of selected vehicles. A fire control programme will be included in the environmental awareness programme.
- Should re-vegetation be exceptionally slow due to dry conditions, the seeded area will be irrigated weekly until a sufficient ground cover has been established.
- A phased re-vegetation programme as discussed under 'mine development' will be followed to ensure timeous rehabilitation of disturbed areas in order to increase control over the process and to limit irrigation required.
- Should re-vegetation fail due to climatic conditions, it will be repeated the following growing season.
- Grazing of domestic stock on re-vegetated areas will not be permitted and the mine area will remain fenced until closure was granted. This aspect must be discussed with the landowner.
- No vegetation/wood outside the mine area shall be removed for fire making purposes.

### **CONSERVATION STATUS / SENSITIVITY**

In terms of the STEP programme there is no protected area in close proximity to the proposed quarry and the immediate surrounding area is categorized as 'Currently not vulnerable'. The area also falls outside any important natural migration pathway for plants, and animals, which if safeguarded, will ensure their current as well as future existence. The study area falls outside the grassland priority areas.

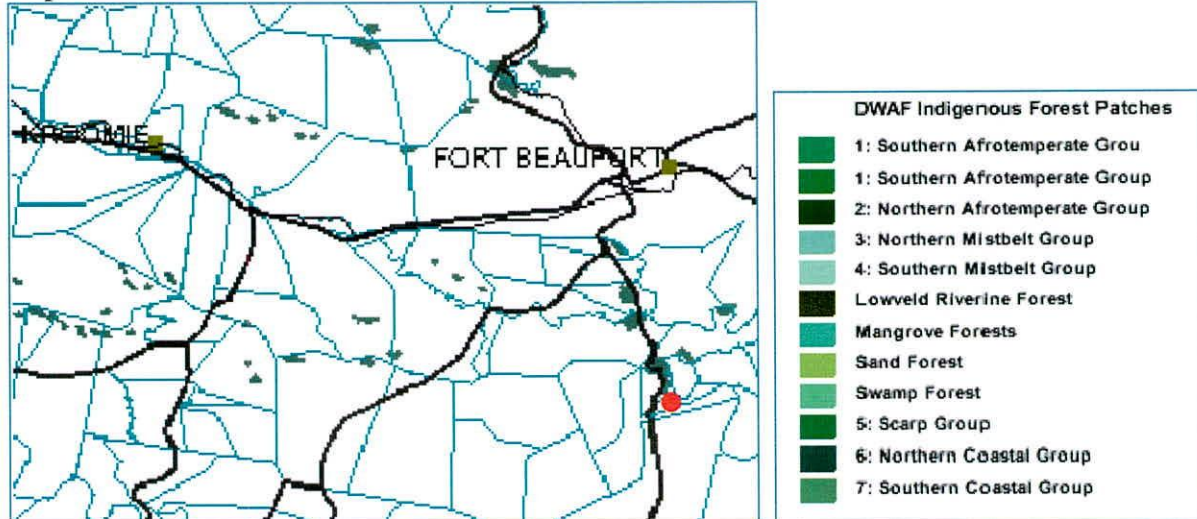


Approximately 50% of the study area constitutes transformed land whilst the remainder forms part of the Bedford Savanna Thicket. In order to ensure that development is not affecting sensitive environments an overview is provided on the ecological status of the proposed quarry area.

### National

In terms of DWAF statistics the quarry area is not located close to any indigenous forest patches, but two minor, isolated Amatola Mistbelt Forest sites are located south of the development area. These forest patches will not be affected.

### **Important Forest Areas**

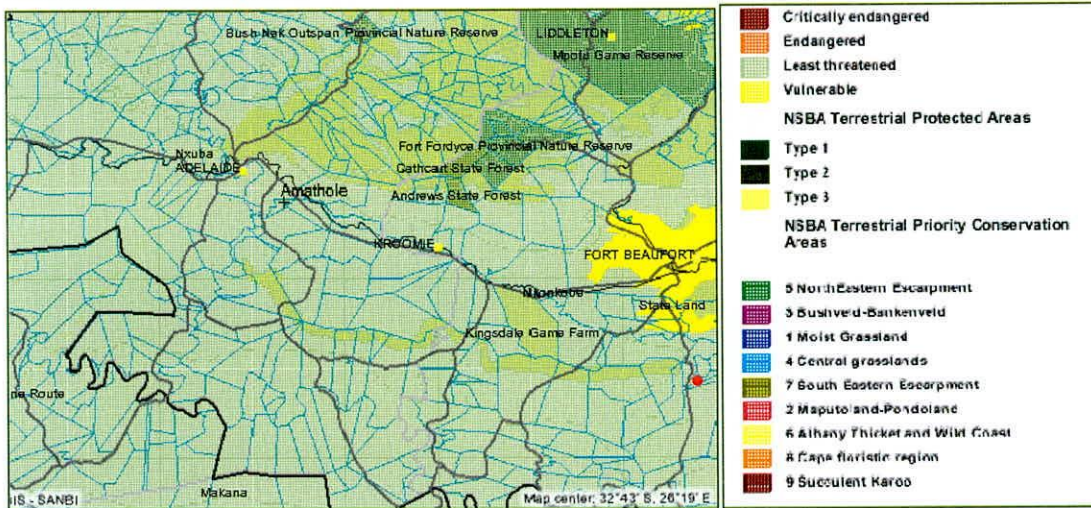


In terms of the NSBA the quarry site is not located within a Terrestrial Priority Conservation Area or important veld type but within an area with conservation status of 'Least Threatened'.

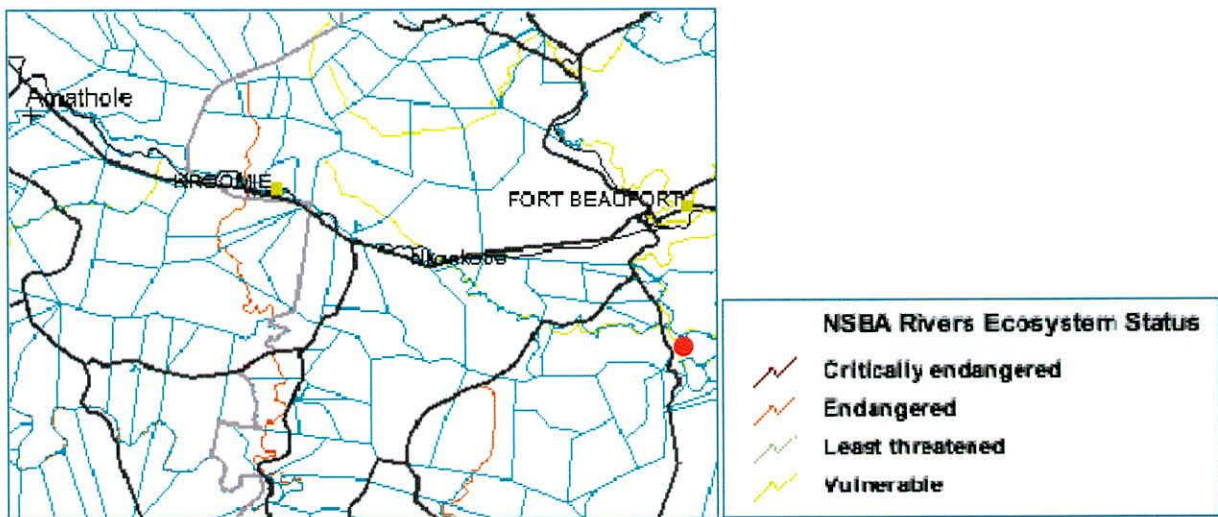
In terms of the NSBA River Ecosystem Status the quarry site is not located near any river system that is under pressure or endangered but immediately north of a vulnerable watercourse.



**NSBA Protected Areas**



**NSBA River Systems**

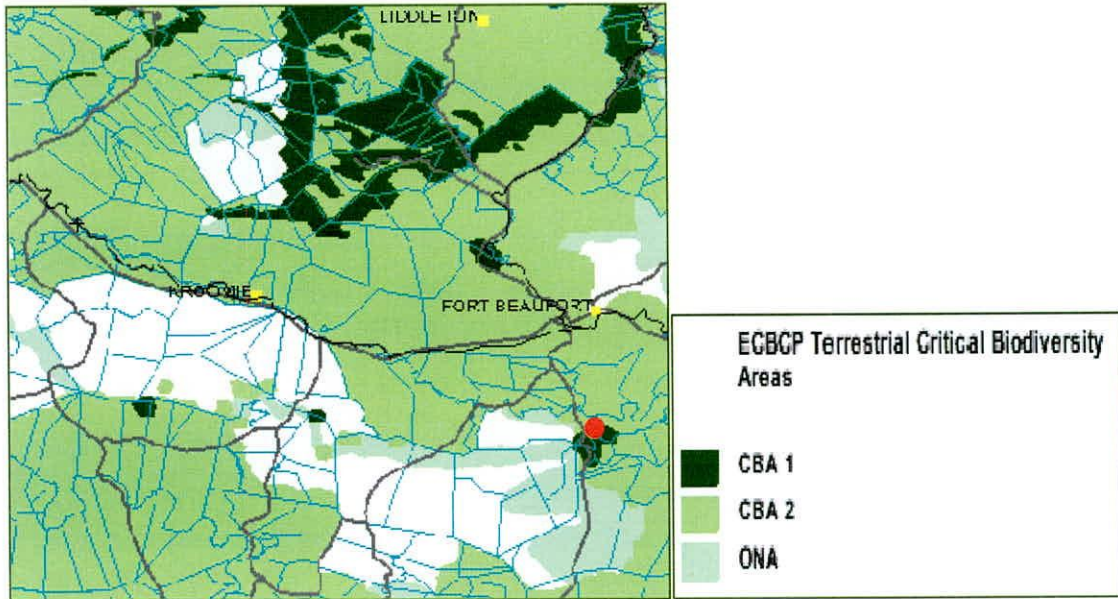


Provincial

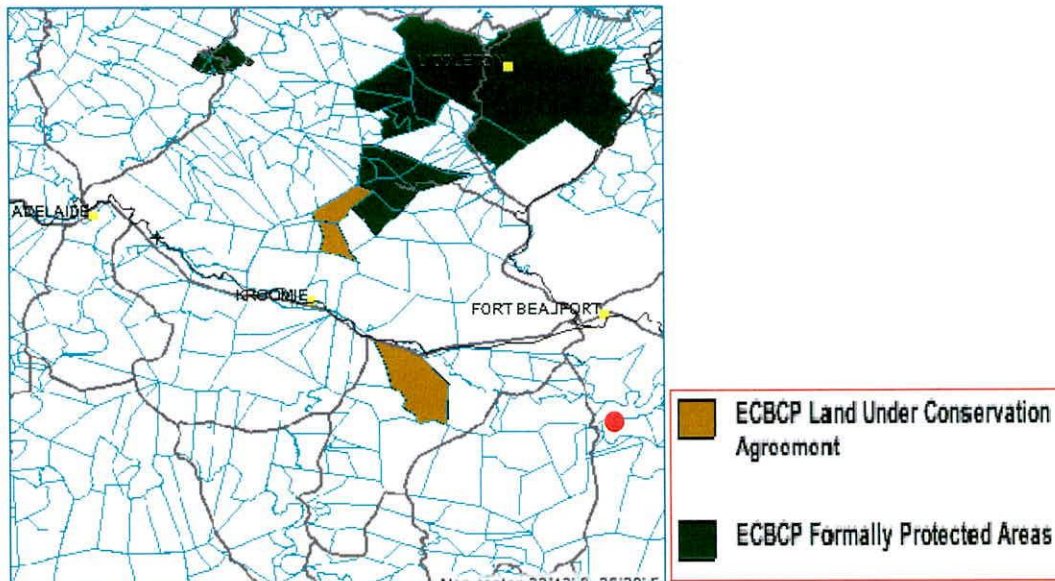
In terms of the Eastern Cape Biodiversity Conservation Plan the area concerned is not incorporated within a formally protected area or land under formal conservation agreement.

The study area is located within a Terrestrial Critical Biodiversity Areas 2 which requires that disturbances in such areas must be limited or avoided and if development takes place, all impacts need to be properly mitigated as such site may function as an important ecological corridor. Considering that the site chosen has already been compromised by fluvial deposits, the use of the identified site and proposed rehabilitation of the quarry site complies with the objectives set for this CBA2 area

**ECBCP: Terrestrial CBA's**



**ECBCP: Protected Areas**

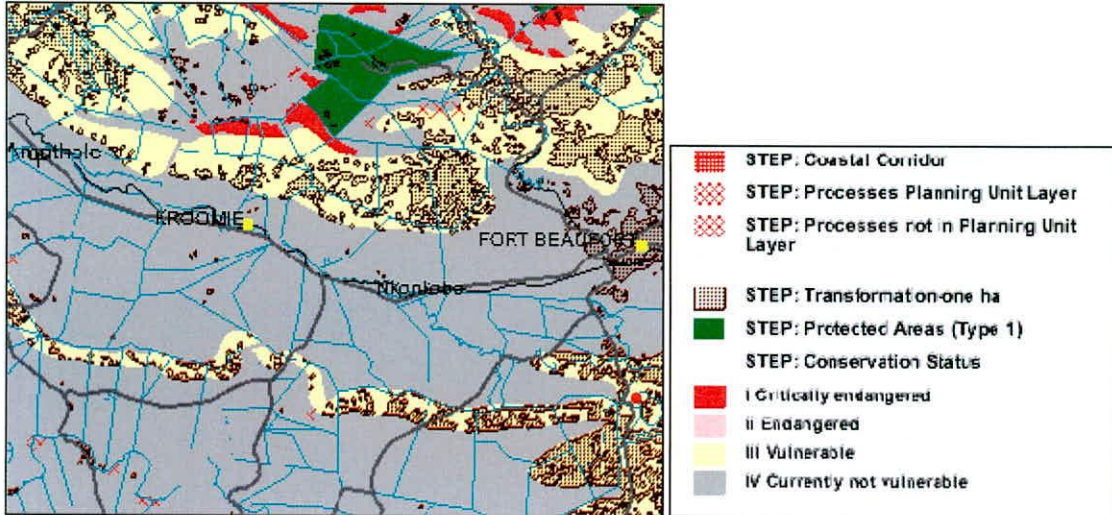


In terms of the NSBA terrestrial ecosystem status the study areas concerned have the status of 'Vulnerable' hence the areas are not subject to any direct ecological threat and can sustain limited further development provided that the necessary mitigation measures are applied.

Also, in terms of the STEP Programme, the study is located in a corridor which is important for the migration/distribution of important faunal or floral species/communities and carries a conservation status of 'Vulnerable'.

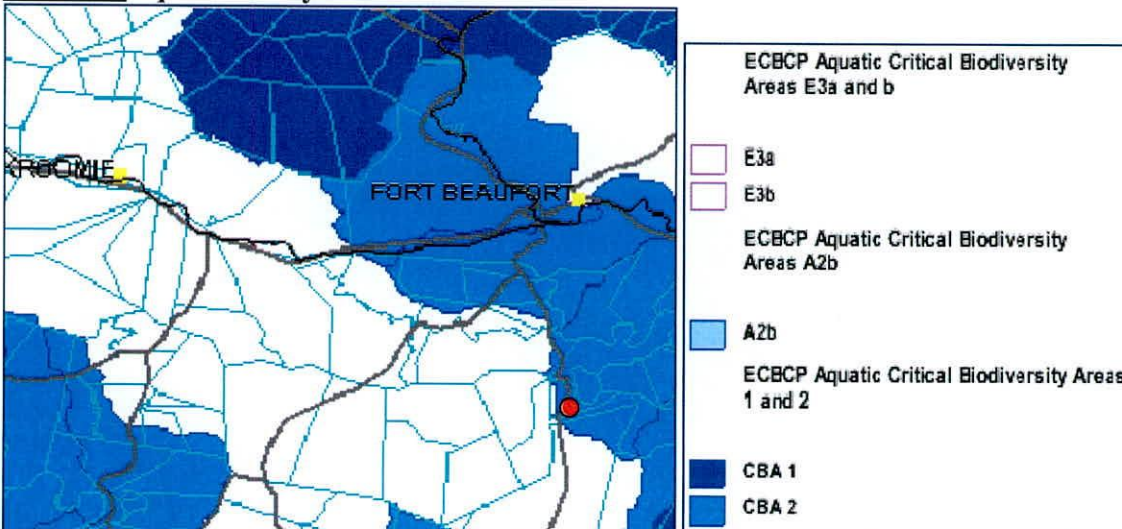


**STEP Corridor**



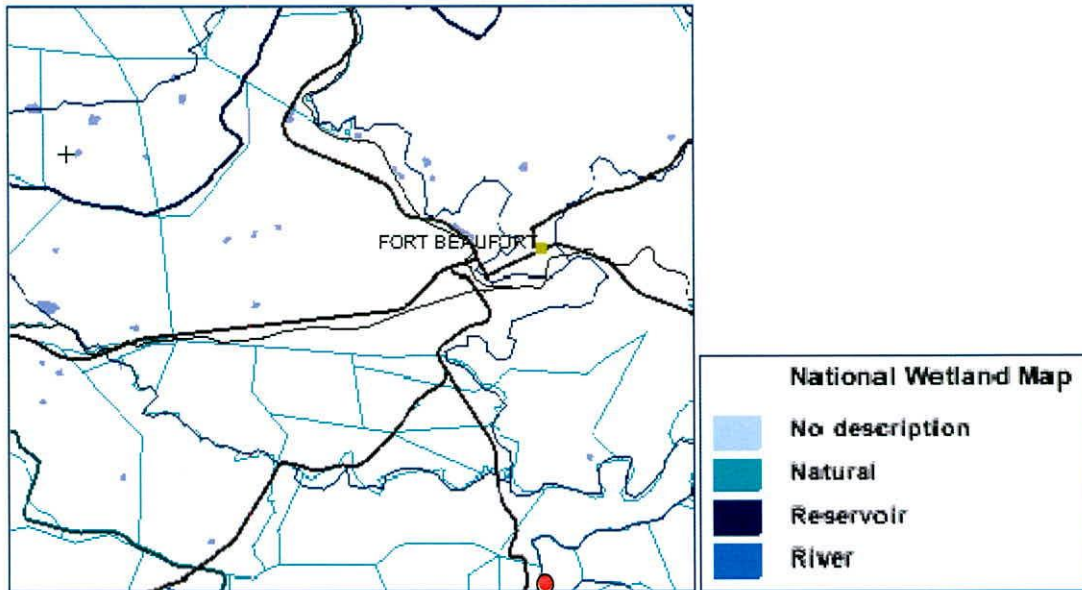
In terms of Aquatic Critical Biodiversity status the study areas fall just inside a CBA 2 area, which indicate that the proposed development might impact on any aquatic system and therefore requires that terrestrial impacts within the catchment must be restricted to the minimum to prevent excessive silt, nutrient and chemical transport to sensitive systems. Considering that no water will leave the quarry and that the process area will be protected from erosion, the objectives of the ECBCP will be achieved.

**ECBCP: Aquatic Ecosystem Status**

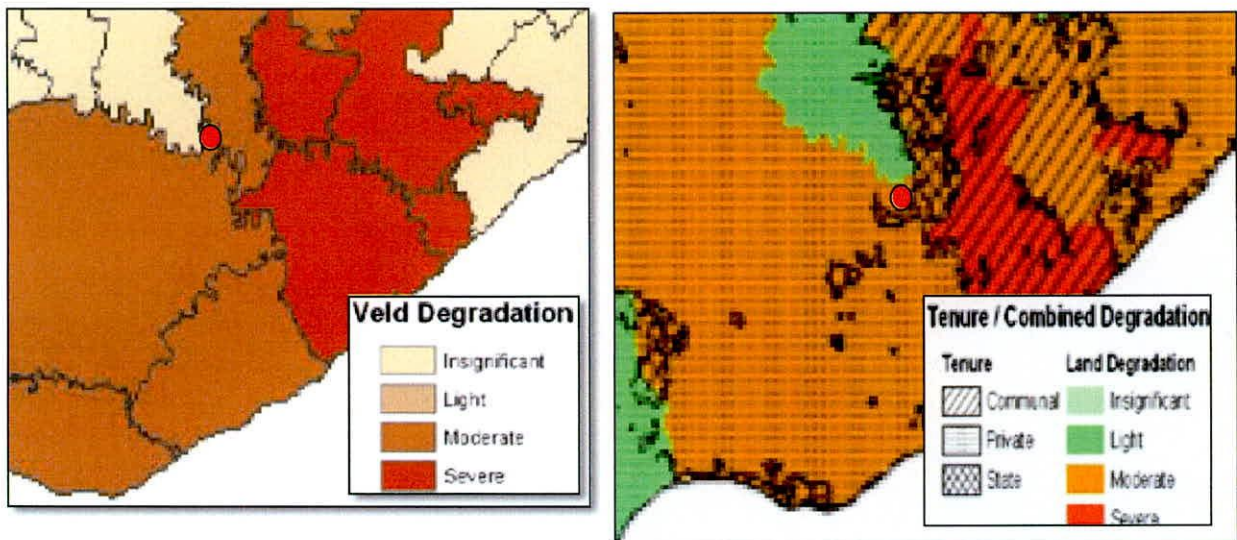


In terms of the National Wetland Inventory the mining site does not host any off-stream or in-stream wetlands of importance hence the proposed development will impose a zero impact on sensitive aquatic systems.

**National Wetlands Inventory**



In terms of the Eastern Cape State of the Environment report the status of the general veld in this area is still good and reflects little degradation. With this backdrop it is important that the quarry site is properly rehabilitated to a functional portion of land that in future can be integrated within the farms grazing system. The conditions of this report is geared towards such end use



Considering the environmental status of the quarry area and immediate surrounds, as well as the distance to protected areas, it is the opinion that the proposed development will not detrimentally affect the ecological functionality of any sensitive environments and the impact is rated very low no additional mitigation measures other than rehabilitating the quarry to an acceptable standard is required.

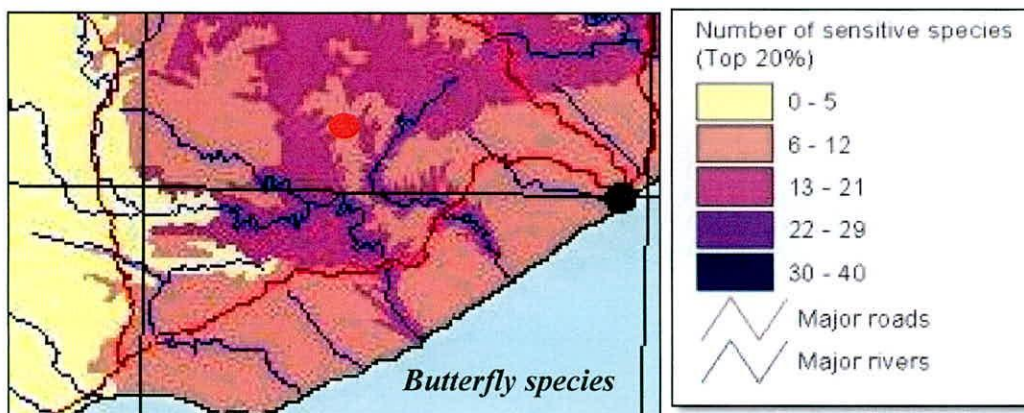
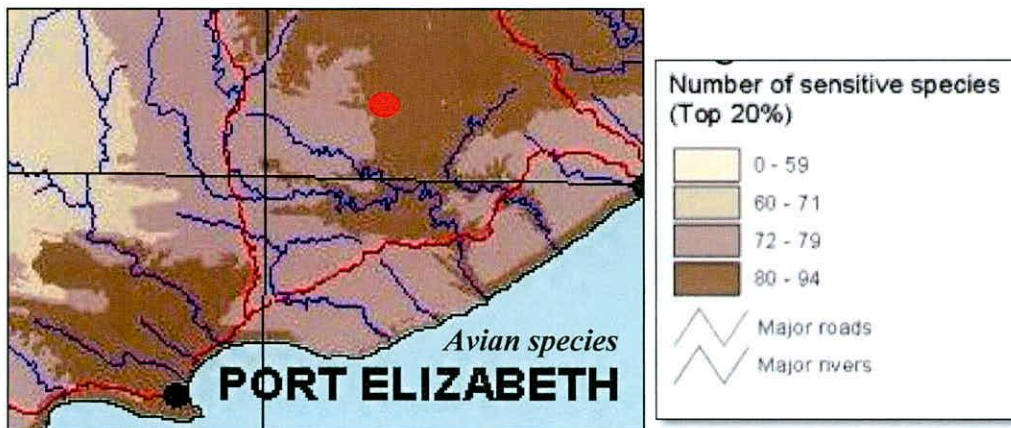


**FAUNA**

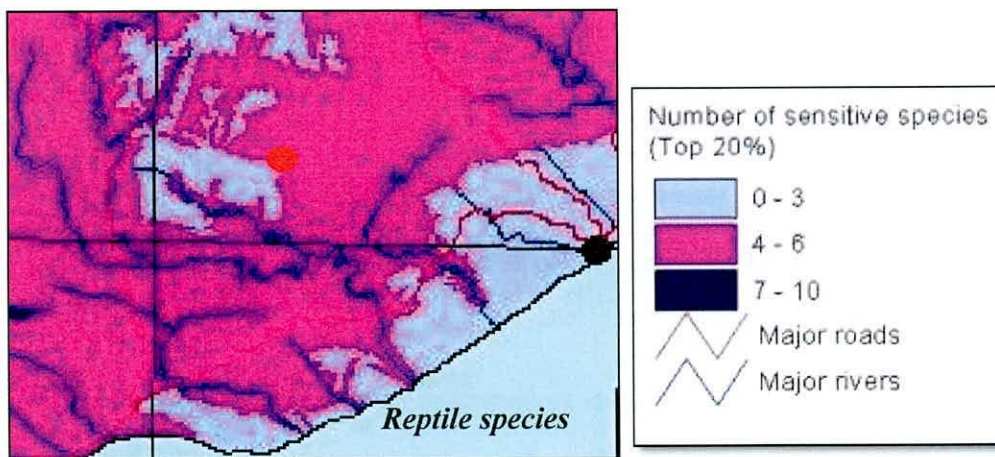
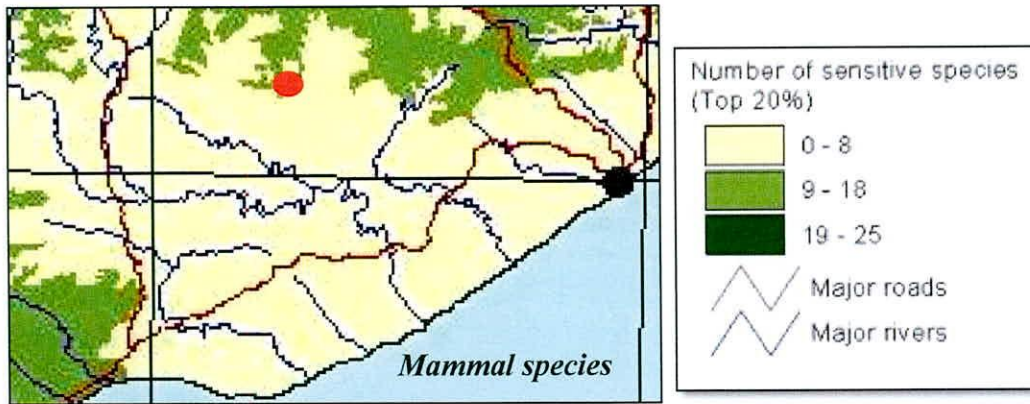
Animals play an important role in maintaining ecosystems for example pollination, spreading of seeds, eradication of pests/insects, forming part of a specific food chain, trimming of vegetation and therefore determining penetrability of vegetation and generation of manure that impacts on soil fertility etc.

In terms of the vegetation analysis the site hosts Bedford Savanna Thicket, which covers an extensive area and due to the extensive food sources that it provides, it should hosts a diverse array of herbivorous mammals. Animals found within this biome tend to be larger than those found in pure grassland or the short scrubland of the Karoo and generally occur throughout the biome and are generally not confined to protected habitats, except for in areas were uncontrolled and unauthorized hunting is taking place.

In order to assess the faunal sensitivity of the site and thus the potential impact on faunal assemblages, reference is made to the broad EMPAT assessment, as well as the broad Eastern Cape State of the Environment Report.

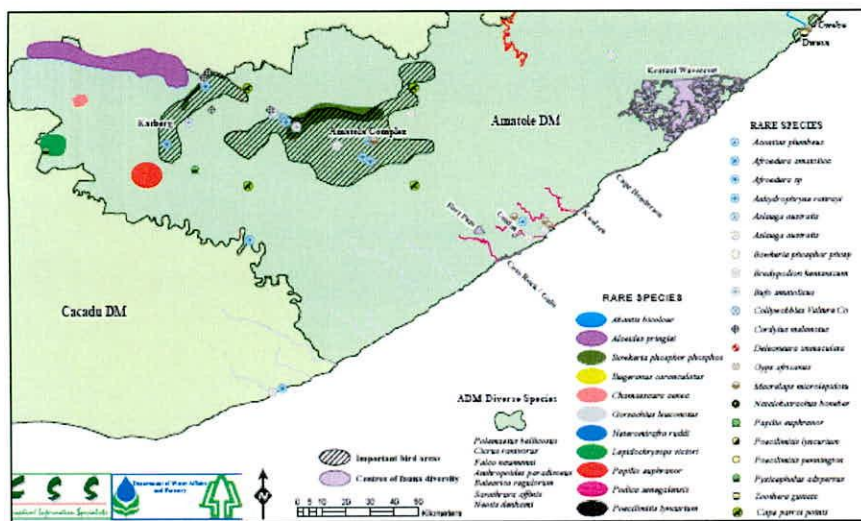


Stutt Quarries: Lifford Sand Quarry



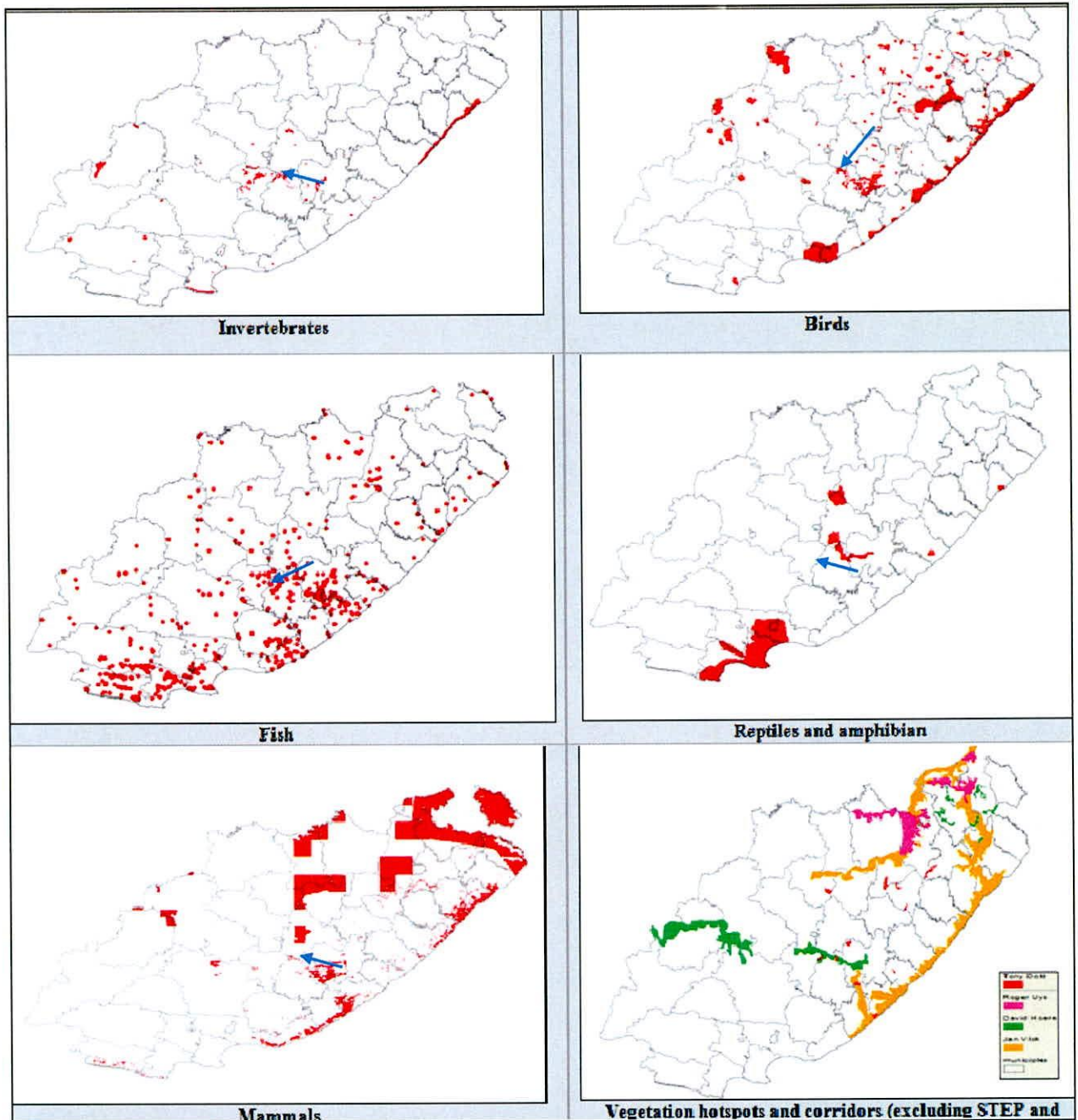
From the above EMPAT maps it seems if the number of sensitive species in this biome is low-medium, except for bird species, which is high.

In terms of the Amatola Conservation Plan the site is located south of the important Katberg complex hosting a number of rare bird species, but it seems if the study area per se is not located within a centre of faunal diversity and is thus less important.





Stutt Quarries: Lifford Sand Quarry



Below follows a list of animals with a status ranging from vulnerable to endangered that possibly could occur within the Amatola District Area and in some cases the Amatola Complex located north of Fort Beaufort. Considering their distribution it seems if the proposed mining area is not located within a critical zone and the potential impact on the animals listed seems of very low significance.

Stutt Quarries: Lifford Sand Quarry

THREATENED INVERTEBRATES OF THE AMATOLE DISTRICT MUNICIPALITY

Table 1

SPECIES NAME	RDB STATUS *	LOCALITIES
<b>Butterflies</b>		
<i>Deleoneura immaculata</i>	Extinct ?	mBashe River Mouth, Dwesa Nature Reserve
<i>Aslauga australis</i>	Rare	Port Alfred, East London, Buffalo Pass, Keiskamma Hoek, Stutterheim, mBashe River Mouth
<i>Iolaua (Epamera) aphnaeoides</i>	Rare	Adelaide
<i>Aloeides pringlei</i>	Indeterminate	slopes of Great Winterberge
<i>Poecilimithis lyncurium</i>	Rare	Tsomo River; Mbulu Forest, Tsomo
<i>Poecilimithis penningtoni</i>	Rare	Gaika's Kop, Amatola Range: Mt Kubusie, Stutterheim; Hogsback, Elandsberg, Seymour
<i>Bowkenia phosphor phosphor</i>	Rare	mBashe River; Mbulu Forest, Tsomo; Stutterheim; Amatole Mountains; Katberg; Fort Beaufort
<i>Lepidochrysops victori</i>	Rare	Huntley Glen Farm, Bedford
<i>Papilio euphranor</i>	Indeterminate	Tsomo River; Mbulu Forest, Tsomo
<i>Abantia bicolor</i>	Rare	East London, mBashe River
<i>Metisella synnx</i>	Rare	Gaika's Kop, Amatola Range
<b>Cicadas</b>		
<i>Nyara thanatolica</i>	recently described	Bosbokstrand

\* Henning and Henning, 1999

Table 2

THREATENED AMPHIBIANS AND REPTILES OF THE AMATOLE DISTRICT MUNICIPALITY

COMMON NAME	SPECIES NAME	RDB STATUS *	LOCALITIES
<b>Amphibia</b>			
Hogsback Frog	<i>Anhydrophryne rattrayi</i>	Restricted (Near Threatened)	Katberg Pass, Didima Range; Hogsback; Seymour; Isidenga Forest; Evelyn Valley, Piries, Stutterheim
Amatola Toad	<i>Bufo amatolicus</i>	Restricted (Near Threatened)	Hogsback, Amatola Mountains; Katberg Pass; Seymour; Hogsback; Gaika's Kop; Fenella Falls
Kloof Frog	<i>Natalobatrachus bonebergi</i>	Unlisted (Endangered)	Dwesa Nat Res
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	Unlisted (Near Threatened)	Bedford; Fort Beaufort; Ballinafad, Committees
<b>Reptilia</b>			
Amatola Flat Gecko	<i>Afroedura amatolica</i>	Unlisted (Near Threatened)	Tor Doone, Hogsback, Amatola mountains; Fort Fordyce NR
Flat Gecko	<i>Afroedura</i> sp	Undescribed (Data Deficient)	Double Drift Nature Reserve, Adam Kranz's viewing point
Transvaal Grass Lizard	<i>Chamaesaura aenea</i>	Unlisted (Near Threatened)	Farm Springvale, Winterberg
Kentani Dwarf Chameleon	<i>Bradypodion kentanicum</i>	Not considered (Vulnerable)	Kentani area near Butterworth
Giant Legless Skink	<i>Acontias plumbeus</i>	Unlisted (Vulnerable)	Brae Lossie, Garubie River, East London; Amalinda NR
Natal Black	<i>Macrelaps microlepidotus</i>	Unlisted (Near Threatened)	Between King William's Town and Stutterheim; Berlin; East London; Isidenga FR; Isidenga FR, Arnoldton, Nahoon Valley, Coffee Bay; Dwesa NR
Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	Vulnerable (Endangered)	Coastal regions
Green Sea Turtle	<i>Chelonia mydas</i>	Vulnerable (Endangered)	Coastal regions
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Vulnerable (Vulnerable)	Coastal regions
Leatherback Sea Turtle	<i>Demochelys coriacea</i>	Vulnerable (Endangered)	Coastal regions

\* Amphibia, Branch 1988 (Harrison et al. 2001); Reptiles, Branch 1988 (probable revised status)

THREATENED MAMMALS OF THE AMATOLE DISTRICT MUNICIPALITY

Table 4

COMMON NAME	SPECIES NAME	RDB STATUS *	LOCALITIES
Lesser Woolly Bat	<i>Kerivoula lanosa</i>	Indeterminate	Pirie; very rare in Southern Africa
Swinny's Horseshoe Bat	<i>Rhinolophus swinnyi?</i>	Indeterminate (taxonomic validity doubtful)	Pirie
Kuhl's Bat	<i>Pipistrellus kuhl</i>	Indeterminate (not threatened ?)	Poorly known in region; widespread, to Europe and India Pirie, Amatole Forest Complex, Stutterheim, Isidenga Forest, Dwesa NR
Giant golden mole	<i>Chrysovalax trevelyani</i>	Vulnerable (Endangered ?)	NR
White-tailed Rat	<i>Mystromys albicaudatus</i>	Vulnerable	Poorly known
Honey Badger	<i>Mellivora capensis</i>	Vulnerable	Widespread but scarce throughout ADM
African Wild Cat	<i>Felis lybica</i>	Vulnerable	Widespread but scarce throughout ADM
Aardvark	<i>Orycteropus afer</i>	Vulnerable	Widespread but scarce throughout ADM
Oribi	<i>Ourebia ourebi</i>	Vulnerable	Restricted to lower Fish River in ADM
South African Hedgehog	<i>Atelerix frontalis</i>	Rare (Vulnerable ?)	Restricted to karroid areas
Spectacled Dormouse	<i>Graphiurus ocellaris</i>	Rare (not threatened ?)	Widespread in Cape in rocky areas
Africa Striped Weasel	<i>Poeciligale albinucha</i>	Rare	Widespread but scarce throughout ADM
Aardwolf	<i>Proteles cristatus</i>	Rare (Near Threatened ?)	Widespread but scarce throughout ADM
Serval	<i>Felis serval</i>	Rare (Near Threatened ?)	Widespread, possibly nearing extinction in ADM
Samango Monkey	<i>Cercopithecus mitis</i>	Rare (Near Threatened ?)	Restricted to forests of escarpment and coastal region
Tree Hyrax	<i>Dendrohyrax arboreus</i>	Rare (Vulnerable ?)	Restricted to forests of escarpment and coastal region
Blue Duiker	<i>Philanthomba monticola</i>	Rare (Vulnerable ?)	Restricted to forests of escarpment and coastal region



Stutt Quarries: Lifford Sand Quarry

Table 3

THREATENED BIRDS OF THE AMATOLE DISTRICT MUNICIPALITY

Common Name	Species Name	Status *	Distribution
Wattled Crane	<i>Bugeranus carunculatus</i>	Critically Endangered	Rare Vagrant (Tsomo)
Rudd's Lark	<i>Heteromirafra ruddi</i>	Critically Endangered	Rare Vagrant (Elliot)
Cape Parrot	<i>Poicephalus robustus</i>	Critically Endangered (**)	Amatola Forest Complex
Spotted Ground Thrush	<i>Zoothera guttata</i>	Endangered	Localised to coastal forests
White-backed Night Heron	<i>Gorsachius leucorotus</i>	Vulnerable	Coastal rivers from East London to Port Alfred
Cape Vulture	<i>Gyps africanus</i>	Vulnerable	Collywobbles at Gorge along mBashe River
Martial Eagle	<i>Polemaetus bellicosus</i>	Vulnerable	Widespread but uncommon throughout AMD
African Marsh Harrier	<i>Circus ranivorus</i>	Vulnerable	Widespread but uncommon throughout AMD
Lesser Kestrel	<i>Falco naumanni</i>	Vulnerable	Non-breeding migrant, widespread but uncommon in AMD
Blue Crane	<i>Anthropoides paradiseus</i>	Vulnerable	Widespread but uncommon throughout AMD
Grey Crowned Crane	<i>Baleanica regulorum</i>	Vulnerable	Widespread but uncommon throughout AMD
Stripped Flufftail	<i>Sarothura affinis</i>	Vulnerable	Widespread but scarce and patchy in AMD
African Finfoot	<i>Podica senegalensis</i>	Vulnerable	Coastal rivers, particularly around East London
Stanley's Bustard	<i>Neotis denhami</i>	Vulnerable	Widespread but uncommon throughout AMD
White-bellied Korhan	<i>Eupodotis cafra</i>	Vulnerable	Sparse and fragmented in AMD
Mangrove Kingfisher	<i>Halycon senegaloides</i>	Vulnerable	Highly localised and restricted to coastal mangrove habitat
Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	Vulnerable	Low densities and marginal in the ADM
Knysna Warbler	<i>Bradypterus sylvaticus</i>	Vulnerable	Scarce in fragmented coastal forest patches.
Black Stork	<i>Ciconia nigra</i>	Near Threatened	Widespread but scarce
Yellow-billed Stork	<i>Mycteria ibis</i>	Near-Threatened	Nomadic, non-breeding visitor
Secretary Bird	<i>Sagittarius serpentarius</i>	Near-Threatened	Widespread but scarce
Crowned Eagle	<i>Stephanoæetus coronatus</i>	Near-Threatened	Restricted to isolated forest patches
Pallid Harrier	<i>Circus pygargus</i>	Near-Threatened	Scarce, non-breeding Palearctic migrant
Balok Harrier	<i>Circus maurus</i>	Near-Threatened	Southern African endemic, scarce and localised in ADM
Peregrine Falcon	<i>Falco peregrinus</i>	Near-Threatened	Widespread but scarce in ADM
Lanner Falcon	<i>Falco biarmicus</i>	Near-Threatened	Widespread and common in ADM
African Black Oystercatcher	<i>Haematopus moquini</i>	Near-Threatened	Coastal region preferring rocky shorelines
Black-winged Plover	<i>Vanellus melanopterus</i>	Near-Threatened	Localised and scattered populations in ADM
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	Near-Threatened	Scarce in ADM, restricted to fast-flowing streams with clear water
Knysna Woodpecker	<i>Campethera notata</i>	Near-Threatened	Localised South Africa endemic
Bush Blackcap	<i>Lioptilus nigricapillus</i>	Near-Threatened	South Africa endemic, localised in temperate forest patches
Orange Thrush	<i>Zoothera gurneyi</i>	Near Threatened	Localised to forest patches
Broad-tailed Warbler	<i>Schoenicola brevirostris</i>	Near-Threatened	Localised to forest patches

\* Barnes, 2000; \*\* upgraded from Barnes 2000 due to change in species status

Reptiles with wider distributions to the north, reaching the southern limit of their range in the AMD Southern.

- African Python (*Python natalensis*) An isolated population of this giant snake was known from the Eastern Cape, although it was always a rarity and became locally extinct when the last recorded specimen was killed near Bathurst in 1927. In the 1980s about 20 specimens were released into the Andries Vosloo Kudu Reserve. They have subsequently bred and dispersed, and specimens have been subsequently recorded from the adjacent Double Drift Nature Reserve (Branch, 1986).
- Natal Black Snake (*Macrelaps microlepidotus*) This medium-sized burrowing snake occurs in coastal forests in the Stutterheim-East London region.
- Transvaal Grass Lizard (*Chamaesaura aenea*) An isolated population occurs in the Winterberg grasslands. Its distant isolation from northern populations indicates that genetic studies are necessary to determine whether it represents a cryptic, undescribed taxon.
- Cape crag lizard (*Cordylus microlepidotus*) An isolated population is common in rock cracks on granite boulders in the Tsomo-Butterworth region. Its taxonomic status remains unresolved (Branch, 1998).
- Drakensberg Crag Lizard (*Cordylus melanotus*), An isolated population of this species, which is common along the Drakensberg Mountains, also occurs on rock outcrops in the Winterberg region. Further studies are required to determine its taxonomic status.



**Threatened species, recorded occasionally in the AMD and to be monitored**

- **Wattled Crane** (*Bugeranus carunculatus*, Iqaqolo), Critically Endangered; near Tsomo (3127Dd), near Elliot (3127Bd) (Barnes, 2000).
- **Rudd's Lark** (*Heteromirafra ruddi*, Unontinga), Critically Endangered; near Tsomo (3127Dc) (Barnes, 2000).
- **Cape Parrot** (*Poicephalus robustus*, Isikhwenene) Treated as Endangered (Barnes, 2000). However, the recent recognition of Eastern Cape and KwaZulu-Natal populations as a separate species from northern populations (the Grey-headed Parrot) means that the Cape species is Critically Endangered and Globally threatened. It inhabits and breeds in patches of Afromontane *Podocarpus* forests, visiting coastal forest during the fruiting season (Wirminghaus et al., 2000, 2001). It is recorded from the Amatole and Katberg-Readsdale forest complexes, Dwesa NR (Barnes, 1998). It is declining in numbers and the South African population is estimated at less than 500 individuals (Barnes 2000). The main threats include habitat loss and illegal collecting for the pet and muti trade (Wirminghaus et al., 1999).
- **Spotted Thrush** (*Zoothera guttata*, Unomacetyacetyana) Globally Endangered. This secretive thrush inhabits coastal and scarp forest understorey. Most important areas for the species in the region include Dwesa NR and Manubi Forest (3226Bc) (Barnes 2000). The South African population is estimated at 400-800 pairs (Barnes 2000) and the main threats include habitat loss and fragmentation.
- **White-backed Night Heron** (*Gorsachius leuconotus*) Vulnerable. This shy heron inhabits heavily vegetated riverbanks. The species has been recorded recently from the Eastern Cape coastal region between East London and Port Alfred (Barnes 2000), but earlier records from the northern Wild Coast (Quickelberge, 1989) have not been reconfirmed and may indicate local extinction (Brookes 1984; Barnes, 2000). The South African population is estimated at 500-1000 individuals (Barnes 2000). The main threat is habitat loss and reduction in prey.
- **Cape Vulture** (*Gyps coprotheres*, Ixhalanga) Vulnerable. The Transkei region remains the stronghold of this threatened species, which remains relatively common over the rugged terrain (Quickelberge, 1989). Breeding colonies in the AMD remain at:
  - confluence of Gcuwa and Bawa Rivers, near Butterworth,
  - Collywobbles on the Mbashe River (largest breeding colony, 400+ birds)The South African population is estimated at c. 4000 pairs (Barnes 2000). The main threat is high mortality caused by food shortages, poisoning, and electrocution and collision with power lines. Infectious disease is considered the most likely explanation for the virtual disappearance of vultures from southeastern Asia during the last decade. A strategy to address the possible spread of disease agents in Africa has been proposed (Anderson and Mundy, 2001) and should be implemented at the important Collywobbles breeding site.
- **Martial Eagle** (*Polemaetus bellicosus*, Ukhozi) Vulnerable. Widespread in woodlands and savanna, with scattered records throughout the AMD. It is the largest eagle in the subcontinent, and may have lost 20% of its regional population within the last three generations. The South African population is estimated at < 600 pairs (Barnes 2000). The main threats are persecution, poisoning, drowning in farm dams and electrocution on powerlines.
- **African Marsh Harrier** (*Circus ranivorus*, Isigobodo) Vulnerable. Widespread in the AMD where suitable marshland and riverine habitat persist (Barnes, 2000; Quickelberge, 1989). The South African population is estimated at 3000-5000 pairs (Barnes 2000). Habitat loss and degradation are the main threats.
- **Lesser Kestrel** (*Falco naumanni*, Utebe-tebana) Vulnerable. A non-breeding summer migrant that roosts gregariously and hunts in open country. Its presence in the AMD is marginal, with most specimens occurring in the northern regions including the Winterberg grasslands. The South African population probably does not exceed 50 000- 60 000 birds (Barnes, 2000).
- **Blue Crane** (*Anthropoides paradiseus*, Indwe) Vulnerable. South Africa's national bird and a near endemic that inhabits dry short grassland. Widespread but marginal in the



northern and western regions of the ADM. Populations in the Eastern Cape have shown marked declines (Barnes, 2000), in association with many reported poisoning incidents (Vernon et al., 1992). The South African population is approximately 21 000 birds (Barnes, 2000).

- Grey Crowned Crane (*Balearica regulorum*, Ithem) Vulnerable. Widespread throughout eastern regions of ADM. Prefers mixed wetland-grassland habitat. The South African population is estimated at 2800-3000 individuals (Barnes 2000). The main threats are habitat loss from overgrazing and frequent fires, collision with powerlines, disturbance and hunting pressures from dogs and humans. Has important cultural significance to many Xhosa people.
- Striped Flufftail (*Sarothrura affinis*, Isahuhu) Vulnerable. Scarce, fragmented and rare in the ADM. Prefers dense, tussock grassland. Not recorded in any protected area in the ADM. The main threat is the degradation of upland grassland habitats. South African population placed at 1440-2150 individuals (Barnes, 2000).
- African Finfoot (*Podica senegalensis*, Umngcana) Vulnerable. A widespread but rare species. It prefers well-vegetated edges of slow-moving rivers. Widespread in coastal rivers, particularly around East London. South African population estimated at 500-1000 individuals (Barnes 2000). The main threats are habitat loss and declines in prey species.
- Stanley's Bustard (*Neotis denhami*, Iseme) Vulnerable. A widespread but rare bustard that prefers high rainfall, open sour grassland. Present absence in eastern Transkei attributed to human disturbance (Quickelberge, 1989), but remains throughout AMD. South African population estimated at <5000 individuals, but few if any protected area hold viable populations (Barnes 2000). The main threats are habitat loss from overgrazing and frequent fires, collisions with powerlines, disturbance and hunting pressures.
- White-bellied Kohran (*Eupodotis cafra*) Vulnerable. Found throughout AMD, but is sparse and in isolated, fragmented populations (e.g. Fort Beaufort, Anon, 2003). Some old populations are now extinct, e.g. King Williams Town. South African population is <5000 individuals (Barnes 2000). The main threats are habitat loss from crop farming, overgrazing, frequent fires and afforestation.
- Mangrove Kingfisher (*Halycon senegaloides*, Isaxwila) Vulnerable. A large kingfisher restricted to coastal mangroves for feeding and adjacent forest for breeding sites. A few breeding pairs are recorded from Dwesa NR (Barnes, 2000). The South African population is estimated at <500 individuals (Barnes 2000), and the main threat has been the loss of mangrove habitat.
- Southern Ground Hornbill (*Bucorvus leadbeateri*, Intsikizi) Vulnerable. Previously found throughout the ADM but becoming increasingly rare (Vernon, 1986). It prefers broad-leaved woodland and grassland. South African population estimated at 1500-2000 individuals (Barnes 2000). Recorded to possibly breed in the Dwesa NR (Barnes, 1998). The main threats is habitat loss, particularly large hollow trees for nesting. Despite its cultural significance it is persecuted for traditional medicinal use which may be the most conservation concern (Mander et al, 1997).
- Knysna Warbler (*Bradypterus sylvaticus*, Inkqotyana) Vulnerable. Endemic to South Africa and restricted to fragmented, mainly coastal, forest patches. Scarce and recorded from East London and Dwesa NR (Quickelberge, 1989). South African population estimated at <2500 individuals (Barnes 2000). The main threat is habitat loss.
- Black Stork (*Ciconia nigra*, Unocofu) Near-Threatened. Wide-spread but scarce in the ADM. Prefers pools in large rivers. Recorded from as an occasional vagrant from East London (Quickelberge, 1989), Great Fish River Reserve (Anon, 2003) and the Amatole and Katberg-Readsdale IBAs (Barnes, 1998).
- Yellow-billed Stork (*Mycteria ibis*, Ingwamza) Near-Threatened. Wide-spread but scarce migrant in ADM, with no local breeding recorded. Nomadic, feeding in fish concentrations in drying pans and river pools.
- Secretary bird (*Sagittarius serpentarius*, Ingxangxosi) Near-Threatened. Widespread in



- NR, Amatole and Katberg-Readsdale IBAs (Barnes, 1998) Sensitive to habitat degradation from overgrazing and bush encroachment.
- Crowned Eagle (*Stephanoaetus coronatus*, Ukhosi) Near-Threatened. Prefers forest habitats. Recorded from: East London; Port St. John's (breeding, Quickelberge, 1989), Dwesa NR, Amatole and Katberg-Readsdale forests (Barnes, 1998). Persecuted by stock farmers, and threatened by forest habitat loss.
  - Pallid Harrier (*Circus pygargus*, Isigobodo) Near-Threatened. Non-breeding Palaearctic migrant scarce in ADM. Formerly common visitor to southern Africa, but now in decline (Harrison et al., 1997). Global population <24 000 pairs (Barnes, 2000).
  - Black Harrier (*Circus maurus*, Isigobodo-esimnyama) Near-Threatened. Endemic to Southern Africa, where it hunts over open grassland. Recorded from: East London (Quickelberge, 1989), and as an occasional visitor to the Katberg-Readsdale forest complex (Barnes, 1998). Global population <1000 birds (Harrison et al, 1997).
  - Peregrine Falcon (*Falco peregrinus*, Ukhetshe) Near-Threatened. Rare and localized in ADM in varied open habitats. Recorded from Dwesa NR, and visitor to Amatole and Katberg-Readsdale IBAs (Barnes, 1998).
  - Lanner Falcon (*Falco biarmicus*, Ukhetshe) Near-Threatened. Widespread in ADM in varied open habitats, breeding on suitable cliff faces. Recorded from Dwesa NR, and breeding in Amatole and Katberg-Readsdale IBAs (Barnes, 1998).
  - African Black Oystercatcher (*Haematopus mouini*, Isinqolamatye) Near-Threatened. Restricted to coastal region throughout ADM, but rare in northern parts. Total population <5000 birds in 1980s, but now increasing. Potential threats include the exploitation of white mussels (*Donax serra*).
  - Blackwinged Plover (*Vanellus melanopterus*, Unotyhiniphi) Near-Threatened. Rare and localized in ADM where it prefers short, burnt grasslands. Seasonal movements associated with rainfall. Recorded from Wavecrest, and known to breed in the coastal grasslands of the Dwesa NR (Barnes, 1998). Genetic evidence that the southern African population is a separate species may require a re-assessment of the threatened status.
  - Half-collared Kingfisher (*Alcedo semitorquata*, Isaxwila) Near-Threatened. Prefers well-vegetated riverbanks with fast-flowing, clear water. The southern Wild Coast region forms a stronghold for the species. Recorded from East London and breeding (2-6 pairs) in Dwesa NR (Barnes, 1998). The main threat is habitat loss, and increased turbidity of rivers due to overgrazing.
  - Knysna Woodpecker (*Campethera notata*, Isinqolamthi) Near-Threatened. Endemic to South Africa, where it prefers forest habitats. Recorded from: East London, Kei River, (Quickelberge, 1989), with breeding pairs recorded from Dwesa NR and Amatole and Katberg-Readsdale forests (Barnes, 1998). The South African population is estimated at 1500-5000 individuals (Harrison et al, 1997), and the main threat is habitat loss.
  - Bush Blackcap (*Lioptilus nigricapillus*) Near Threatened. A localized South African endemic of temperate forest. Breeding pairs recorded from Amatole and Katberg-Readsdale forests (Barnes, 1998). Threatened by loss of forest habitat.
  - Orange Thrush (*Zoothera gurneyi*) Near Threatened. Rare and localized in the ADM, breeding in deep, shaded kloof forests along the escarpment, moving to coastal forests in winter. Breeding pairs recorded from Amatole and Katberg-Readsdale forests (Barnes, 1998). Threatened by loss of forest habitat.
  - Broadtailed Warbler (*Schoenicola brevirostris*, Umvokontshi) Near-Threatened. Marginal to the ADM, reaching its southern breeding limit near Dwesa. Prefers coarse, dense grass on edge of marshy areas. From 5-10 breeding pairs recorded from Dwesa NR (Barnes, 1998). Threatened by fires and overgrazing.



### Description of Red Data species of mammals occurring in the ADM

- Giant Golden Mole (*Chrysofalax trevelyani*) Vulnerable (Endangered ?)  
Inhabits forest habitats. Little is known of their biology, and some reports are contradictory (Poduschka, 1980; Maddock, 1986; Gaylard and Castley, 1996). They appear to feed on giant earthworms (*Microchaetus* sp.). Recorded from Pirie Forest (Swanepoel, 1988), East London, Dwesa NR, Amatole and Katberg-Readsdale forest complexes, (Barnes, 1998). Threats include: habitat destruction; feral hunting dogs. Has become extinct in some regions.
- White-tailed Rat (*Mystromys albicaudatus*) Vulnerable  
An endemic South African rodent that inhabits savanna and grassland habitats. Has high taxonomic importance as it is sometimes placed in its own subfamily (Mystromyinae). Widespread but rare.
- Honey Badger (*Mellivora capensis*) Vulnerable  
Widespread but rare and inhabiting varied habitats. Recorded from the Katberg-Readsdale and Amatole forest complexes (Castley, 1997; Barnes, 1998). Threats include habitat loss and persecution. The latter often comes from commercial honey producers after badgers damage bee hives. However, this can be virtually eliminated by careful positioning of the hives and 'Badger-friendly' honey is now being commercial offered.
- African Wild Cat (*Felis lybica*) Vulnerable.  
Widespread but rare, in varied habitats. Threats include persecution, habitat loss and hybridization with feral domestic cats.
- Aardvark (*Orycteropus afer*) Vulnerable  
Widespread but rare, and inhabiting varied habitats. Threats include persecution and habitat loss.
- Oribi (*Ourebia ourebi*) Vulnerable  
Prefer open grassland with scattered cover. Within the Cape the species' range has contracted to the Bathurst District and adjacent ADM), which represents the southern limit of the species (van Teylinge and Kerley, 1995). Threats include hunting and habitat loss.
- South African Hedgehog (*Ateleurix frontalis*) Rare (Vulnerable ?)  
An unmistakable small, nocturnal, terrestrial insectivore of grassland and bushy habitats. Threatened by bush encroachment, insecticide use, and road mortalities.
- Spectacled Dormouse (*Graphiurus ocellaris*) Rare  
A secretive, rock-living rodent that is widespread. It is secretive and may be more abundant than thought and thus not threatened.
- Africa Striped Weasel (*Poeciligale albinucha*) Rare  
Widespread but rare, in open woodland and savanna. Threats include persecution and habitat loss
- Aardwolf (*Proteles cristatus*) Rare (Near Threatened ?)  
Widespread but rare, in varied habitats. Threats include persecution and habitat loss.
- Serval (*Felis serval*) Rare (Near Threatened ?)  
Coastal regions in moist habitats. Threats include persecution and agricultural development. Considered to be almost extinct in the Eastern Cape (Swanepoel, 1988).
- Samango Monkey (*Cercopithecus mitis*) Rare (Near Threatened ?)  
Restricted to eastern coastal forests. Although some populations adapt well to semi-urban areas (e.g. Port St. Johns), the small, highly-fragmented populations in the eastern coastal regions remaining are threatened by continued hunting and habitat loss.
- Tree Hyrax (*Dendrohyrax arboreus*) Rare (Vulnerable ?)  
Inhabits escarpment and coastal forests. No range contraction in the Eastern Cape has been noted (Jennings and Jennings, 1993). Recorded from the East London coastal forests, Isidenge Forest, Hogsback, Pirie (Jennings and Jennings, 1993), and the Amatole forest complex (Castley, 1997; Barnes, 1998). Threats include habitat loss, wood collecting, and hunting. Taylor (1998) noted that although rarely seen, surveys using tape recordings in KwaZulu-Natal showed the species to be more common than believed.



**Blue Duiker (*Philanthomba monticola*) Rare (Vulnerable ?)**

Inhabits forests, thicket and dense coastal bush. Threatened by hunting and habitat loss, and subject to local extinction. Recorded from the East London coastal forests, Isidenge Forest, Hogsback, Pirie, and the Amatole forest complex (Swanepoel, 1988; Castley, 1997; Barnes, 1998). Threats include habitat loss and hunting.

In order to ensure that the minimum impact is imposed on any animal species, a mindful mining approach will be followed. Mining would be restricted to the smallest area possible and the slow extraction rate would provide adequate time for migration of any animals remaining on site to be sustained in similar adjoining habitats. In addition, noise generated by vehicles will cause most animals to vacate the site on a temporary basis. Noise levels on site will range between 55 and 80 decibels at the mine boundaries and will tend to drive animals away from it, which would preclude them, getting affected within the mine area.

Indiscriminate hunting/trapping/poaching could be a potential problem and the necessary discipline has to be enforced and monitoring to be implemented. The applicant will take responsibility for any animal that is proved to be killed by quarry staff. Strict management measures will be put in place and severe penalties will be applicable if any animal on site is poached.

Since the site does not constitute a definite corridor for animal movement, especially due to its close proximity to a disturbed area and main road, migration patterns of animals will not be detrimentally affected. The close proximity to roads and almost continuous traffic will cause animals to move away from the site.

Limited hydrocarbon spillages anticipated would not detrimentally affect fauna on site as it would be localized and dealt with in an expedited manner. Storage of hydrocarbons and the servicing of vehicles will be strictly controlled hence no impact is anticipated. Considering the operational procedures at the applicant's other quarry concerns this impact would not realize. As the quarry area is not directly linked to any drainage channel and movement of vehicles will not take place in close proximity to stream environments, no aquatic fauna will be affected.

The post mining vegetation cover will, from an ecological point of view, over time provide for limited protection, forage and nesting possibilities and would constitute an improved ecological niche which will provide the opportunity for animals to return to the rehabilitated environment but only if infill planting is done.

In conclusion, it is the author's opinion that the removal of the vegetation in the study area will not result in the extinction of any species or decrease in species numbers and the impact on the faunal diversity of the site is rated very low. Mining will be restricted to a limited area and the slow extraction rate would provide adequate time for migration of any animals remaining on site to be sustained in similar, adjoining habitats. Noise generated by vehicles will cause some animals to vacate the site during the day and return during the night and over the weekends when the impacts imposed are minimal. During the operational phase, the impact of mining on fauna is rated of low significance. Rehabilitating the quarry site would provide an adequate ecological niche for some animals to re-colonize in the area.

The positive socio-economic impact of the proposed operation will definitely outweigh the impact on fauna and flora of the area, provided that the rehabilitation proposals are followed. Subject to that



animals are not disturbed/hunted by humans, it is known that animals grow accustomed to noises and would eventually return to their former niche area during quieter times or when disturbed areas are adequately rehabilitated.

**Impact on Fauna with mitigation**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Site Specific	Site Specific
<b>Duration</b>	Long Term	Medium Term	Medium Term
<b>Intensity</b>	Low	Low	Very Low
<b>Probability</b>	Likely	Likely	Probable
<b>Status</b>	Negative	Negative	Positive
<b>Confidence</b>	Medium	High	High
<b>Significance</b>	Low	Low	Very Low

Remedial measures to be implemented are:

- Vehicles will not display fuel, oil or lubricants leaks and will be maintained to an acceptable standard offsite.
- Any fuel spills will be cleaned up immediately and the contaminated soil removed to the closest waste facility.
- Handling of fuels will be in accordance with all applicable protocols & legislation to prevent pollution incidents.
- Movement of vehicles will be restricted to the authorized mine area.
- No animals entering or settling in the mine area will be disturbed or killed and this requirement will be included in the environmental awareness programme, which must be included in an environmental awareness programme to be developed for the workforce
- No hunting or snaring would be allowed outside or inside the mine area and the applicant will implement a severe penalty system for people transgressing this requirement. In addition, the owner or manager will remove any of the staff caught interfering with stock/wildlife from the site immediately. The surrounding area will be inspected for snares on a regular basis.
- All animals found in working areas where they might be injured, will be relocated to areas outside the mine area.
- Nesting sites will be temporarily excluded from the mine area or be carefully relocated. No eggs from any nest may be removed.
- Areas to be cleared will be swept by a competent/responsible person before vegetation is removed.
- Relocate any herpetofauna and slow moving animals to areas outside the mining areas.
- Disturbed areas will be properly rehabilitated as per the process outlined in the re-vegetation programme.
- No vegetation outside the mine area will be removed and spread of alien vegetation will be prevented.
- Veld fires will be prevented by only allowing cooking fires in designated areas in appropriate appliances as discussed elsewhere. The applicant will take full responsibility for any financial losses that is the result of negligence in this regard.
- Mining area will be clearly demarcated and areas outside it will be out of bounds.



- Production faces will be profiled properly to ensure that it does not pose any danger to animals and to facilitate proper re-vegetation.
- Mining will not impact on any surface water area.
- Pesticides/poisons will not be used in a careless or uncontrolled manner and only approved pesticides should be used for example on rodents in the office area. No poisons may be placed outside the office or in the veld.
- Noise generation will be curbed by servicing and maintain mining equipment properly.

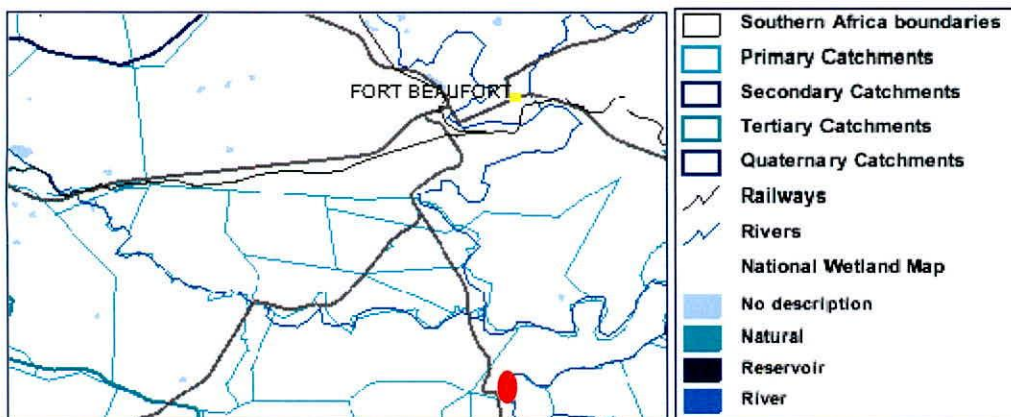
## **SURFACE WATER**

The site is located in the Fish River Catchment (South-eastern coastal hinterland) area and is administered under the Water Management Area: Keiskamma to Fish River. There is no water transfer scheme in close proximity to the site.

According to hydrology maps the area receives an annual precipitation of approximately 500mm per annum and experiences annual evaporation of approximately 1400mm with a MAP-MAR response of 4, which is directly related to topography, vegetation cover and penetrability of soils. The catchment is characterized by undulating hills which will increase velocity of runoff rates and same can be expected within the process area and storm water control structures must be able to accommodate this increase in runoff during high precipitation rates. The moderate rainfall that the area receives would assist re-vegetation processes during the summer periods and irrigation thereof might not be necessary during normal climatic conditions.

Mean annual tertiary catchment runoff in the map area varies between 0-50mm (5-10 mil.m<sup>3</sup>) indicating good infiltration and positive water balances during the rainy season.

The study area is not located close to any drainage system and should therefore not affect surface water quality in the area. The study area is drained by the R67 north of the site. Although the site is located along the Great Fish River, mining activities will not affect surface water abstraction activities as an intact sand buffer zone of 30-60m will be left intact and unmined between the site and the river.



To limit runoff in the quarry, if any, it will be developed and rehabilitated in phases, which will also prevent the silt load of water in the excavation being increased.

### *Sewage*

Potentially, the toilet facilities could cause coliform contamination of surface runoff, but due to the limited number of people onsite and the fact that it is a closed system will cause this impact to be of low significance provided that it is correctly maintained. The site is not located near any abstraction points or cultivation areas therefore any minor spills that might occur, will impose a negligible effect.

### *Hydrocarbons*

The limited number of equipment/vehicles to be used onsite and the fact that the applicant will perform major maintenance work off-site in Fort Beaufort or at a local garage, will reduce the risk of possible surface water pollution. Vehicles will also not be cleaned onsite hence oil contaminated wash water will not be a consideration.

No bulk fuel storage facilities will be housed onsite therefore no water pollution can occur. It is, however, essential that all storage areas, if any, are protected with bund walls and sumps to contain spills effectively. Emergency repairs onsite could lead to limited contamination of surface water but the limited amount of vehicles and low extraction rate, as well as the use of appropriate receptacles such as drip pans, will cause this impact to be negligible. This impact is rated of low significance.

### *Waste*

Since no processing plant will be housed on site no contaminated or toxic wastewater will be generated; therefore no treatment facilities for this purpose are needed. Due to the low number of workers that will be onsite limited amounts of household or industrial waste would be generated and therefore management facilities would be restricted to one or two waste bins in the area.

### *Water Consumption*

Potable water will be brought to site or will be obtained from the river, but this will be minimal. If it is required to irrigate vegetated areas during extreme dry periods, ad hoc consumption will not exceed 30m<sup>3</sup> per week. Water for dust suppression at the stockpile area will be required and will be obtained from similar source. During worst case climatic conditions water consumption will not exceed 15 cubic meters per day whilst during periods of low wind speeds it will not exceed 5 cubic meters per day. Under non-draught conditions the mentioned water consumption should not impose any major impact on water availability but during periods of draught water might need to be trucked in from Fort Beaufort. Water will be stored onsite in elevated JoJo PVC tanks.

### *Haul Road*

It is unlikely that the haul road would be a source of increased silt laden runoff, but if such scenario develops, it will be controlled by cross and side drains to direct runoff to the grassland where silt will be filtered out. To the north of the site, the R67 drains runoff water away from the site.

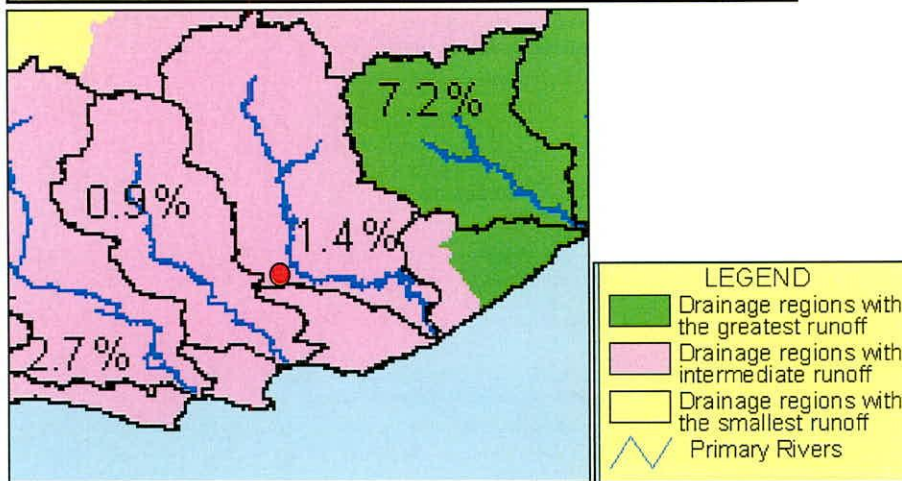
A negligible impact on surface water quality is anticipated.



**Impact on surface water quality and quantity**

	<b>OPERATIONAL with mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Local	Site Specific
<b>Duration</b>	Medium Term	Short Term	Short Term
<b>Intensity</b>	Low	Very Low	Very Low
<b>Probability</b>	Likely	Probable	Unlikely
<b>Status</b>	Negative	Negative	Negative
<b>Confidence</b>	Medium	High	Medium
<b>Significance</b>	Low	Very Low	Insignificant

**DISTRIBUTION OF ANNUAL SURFACE RUNOFF**



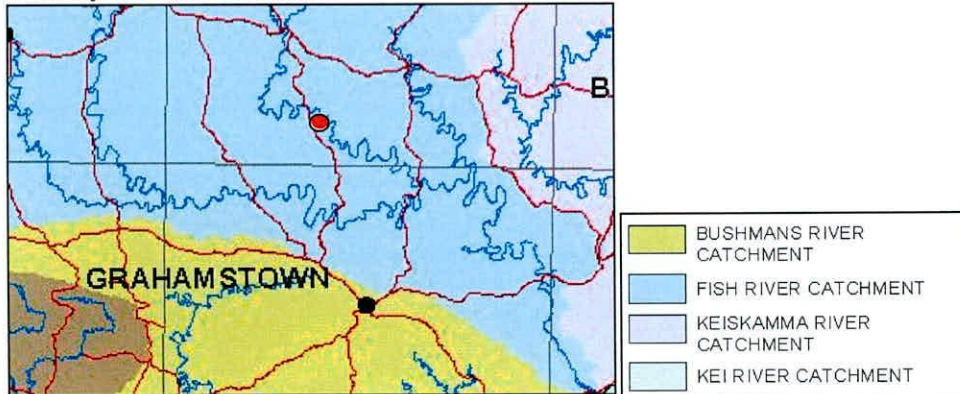
**GROUNDWATER**

The thick E-horizon in most of the area is underlined by phyllite, calcareous sandstone, sandy limestone and conglomerate and due to the high permeability of these layers it would facilitate recharge of the groundwater that occurs at a depth of approximately 50-80 m.

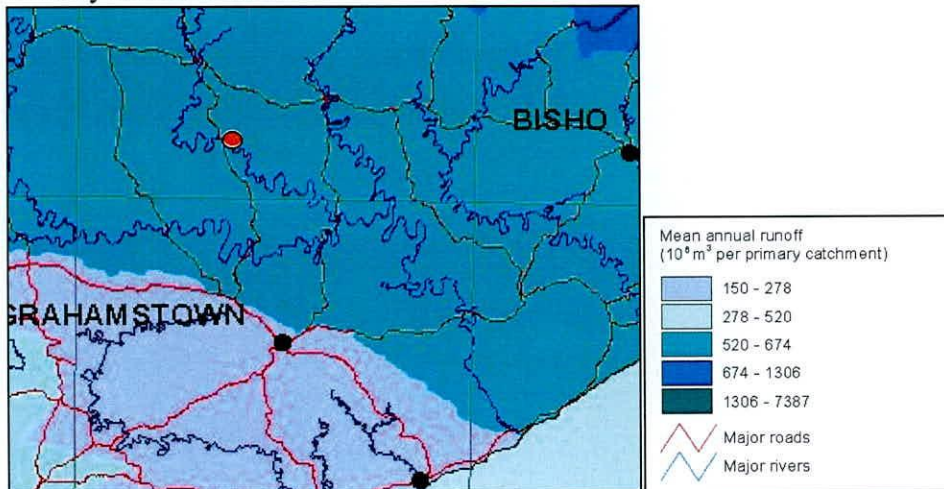
No hydrocarbon storage or draining would take place within the mine area therefore a negligible impact is anticipated. Vehicles will also not be cleaned onsite. Spillage of fuels and lubricant could induce the same impact and should be avoided at all cost. However, according to hydrological maps no groundwater can be obtained from this area and the reliability would be exclusively depended on precipitation rates.



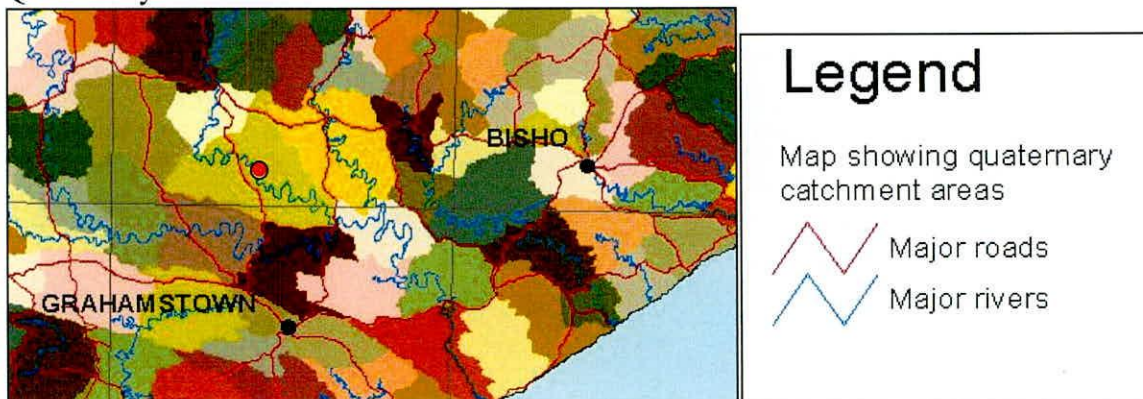
Primary Catchment Names



Primary catchment runoff

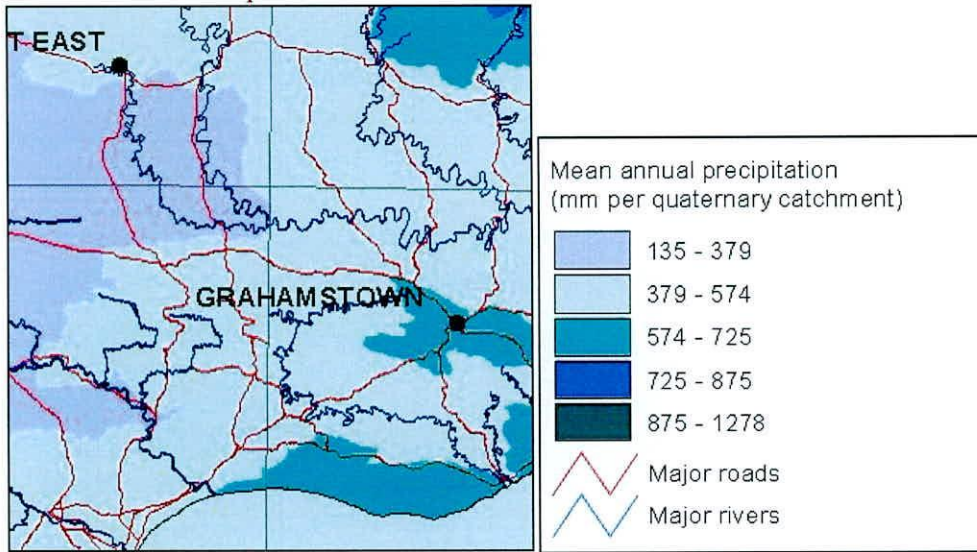


Quaternary Catchments

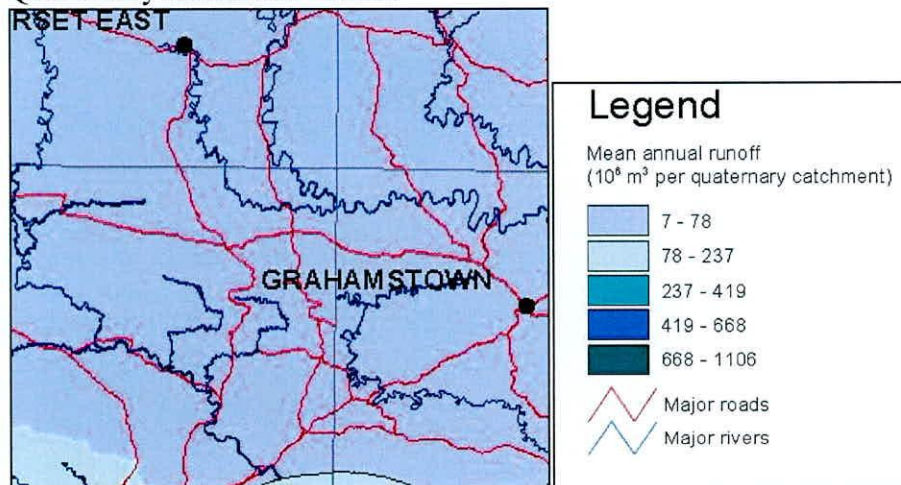




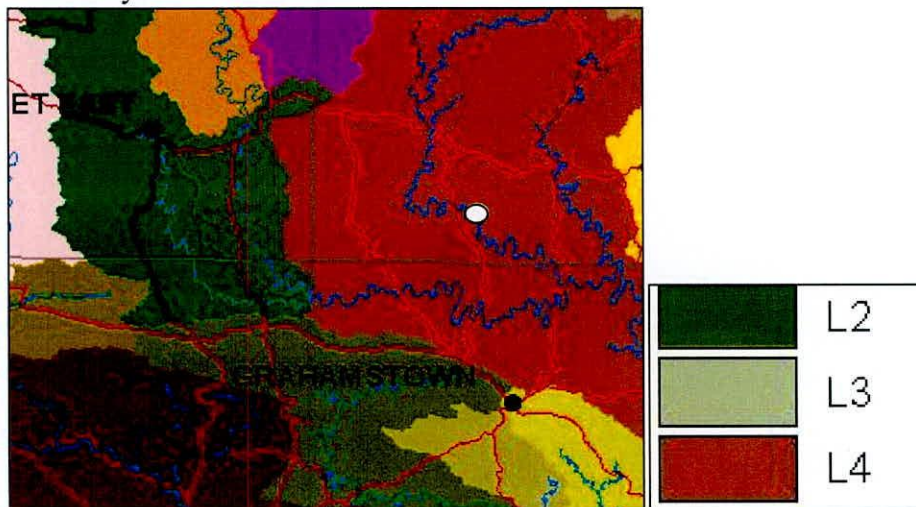
Mean Annual Precipitation



Quaternary Catchment Runoff

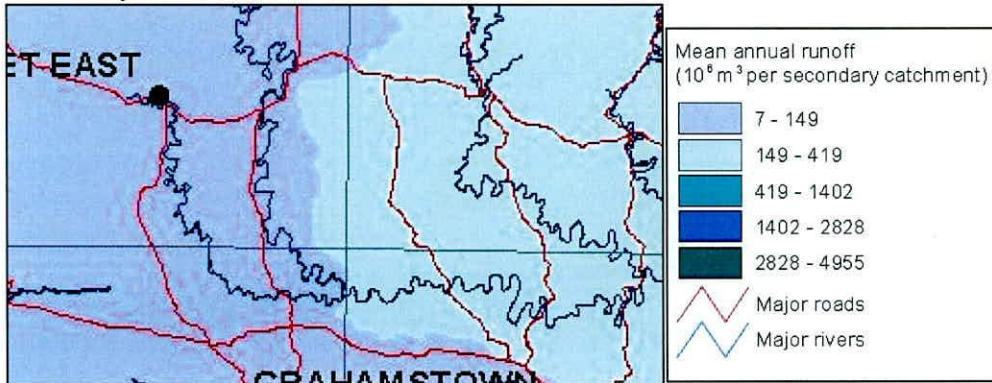


Secondary Catchment Codes





Secondary Catchment Runoff



**Water consumption**

Water from the river might be used for rehabilitation purposes, if the growing season is particularly dry. Drinking water will be brought to site from the applicant’s workshop in town. No mineral processing will take place and no impact is expected.

Considering the low silt content of the content of the E-horizon, the fact that no groundwater will be used for rehabilitation activities; the insignificant loss in recharge potential as well as adequate control over petrochemical substances will cause the overall impact on groundwater to be very low to insignificant.

**Impact on ground water quality and reserves**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Site Specific	Site specific
<b>Duration</b>	Short Term	Short Term	Short Term
<b>Intensity</b>	Low	Low	Negligible
<b>Status</b>	Slightly Negative	Slightly Negative	Neutral
<b>Confidence</b>	High	High	High
<b>Significance</b>	Very Low	Insignificant	Insignificant

Remedial measures to be implemented are

- Chemical toilet will be maintained to Municipal specification, will be inspected on a regular basis and be located along the excavation and staff shall make use of it instead of the veld.
- No storage of hydrocarbons will take place onsite.
- Mining will be restricted to the proposed depth and footprint.
- Mining will be done according to the mine plan provided.
- Mining would not proceed deeper than 2 - 4 m and would not intersect any main aquifer.
- All disturbed areas will be vegetated as soon as possible as per rehabilitation plan.
- No foreign or unapproved material/substance will be dumped or stored within the footprint of the mine.



- No stockpile of any nature will be placed outside the mine area.
- Vehicles will not use alternative roads or damage vegetation outside the approved mine boundary.
- Waste will be contained in receptacles stationed at appropriate areas within the excavation and be removed from the quarry area on a weekly basis or whenever necessary. No household or industrial waste will be burnt or buried on the site.
- Refuelling of vehicles will be done offsite.
- Only emergency repairs will take place and must be done over a drip pan.
- Vehicles/equipment shall be maintained to a high standard and shall not display any major leaks.
- Any contaminated spares, oil filters and gaskets will be placed in a suitable receptacle and immediately removed from the property to an approved facility.
- If spills do occur, the affected soil will be removed to an approved waste site. Super absorbing material such as Peatsorb or Spillsorb or alternatively sawdust will be kept onsite and used to contain any potential spills.
- In case of large, critical spills the DWEA and DME will be informed immediately for assistance and advice and a competent company conversant with bio-remediation will be appointed as soon as possible to address the possible impacts of such spill. All costs would be for the account of the applicant.
- Management will not entertain hydrocarbon spills on site and where necessary, financial penalties would be imposed on workers in cases of negligence.
- No hydrocarbons or hydrocarbon-contaminated material/parts will respectively be drained in the soil or buried on the property.
- All dysfunctional equipment and vehicles will be immediately removed from site.
- The applicant accepts the principle of 'polluter pays'.

## **AIR QUALITY**

The amount of dust generated on a mining area is directly linked to the type of material that is extracted, mechanical processes involved, traffic volumes, wind speed and soil moisture content. The finer the material (more easily airborne) and the higher the clay and silt concentrations, the more severe the impact will be. The dryer the soil becomes the more dust it generates therefore topsoil must be replaced, seeded and irrigated as soon as possible. As an alternative it could be covered.

### **Dust**

The air quality of the immediate surroundings is extremely good due to its rural status. During windy periods a very limited amount of dust may be liberated into the atmosphere, but will be an insignificant increase in air pollution levels. The same scenario applies when motorists are using gravel roads. It would on the other hand not exempt the applicant to implement measures to keep disturbed areas as small as possible and to reduce dust generation when and wherever possible.

Dust associated with Aeolian sand deposits is deemed not to have a detrimental impact on the abutting landowners. Mining and loading of the sand deposit does not generally generate dust due to the low silt content of the deposit. Wind erosion might increase when strong wind blows and deposits small amounts of dust and sand in the atmosphere. The removal and storage of topsoil pose a higher risk in terms of dust generation and needs to be controlled effectively, especially during periods of high winds.

However, should topsoil be spread and seeded in accordance with the re-vegetation plan, this impact would become insignificant. Should the topsoil be stored for lengthy periods, it would be wise to revegetate the stockpiles and/or cover them with vegetation removed from the mining area; this needs to be avoided at all cost.

The fact that the mineral at the floor of the proposed excavation might be humid, will decrease possible dust to be airborne.

If dust generation does become a problem, the area can simply be irrigated once or twice per day. During extreme climatic conditions, dust generation would still be very low. The fact that there are no people residing close to the mine negates this impact to some extent.

Being zoned an agricultural area; it would also be marginally acceptable to experience small quantities of windblown dust every now and then. It does, however, not exempt the applicant to implement measures to keep disturbed areas as small as possible and to reduce dust generation from topsoil stockpiles.

No more than 20 truckloads would be carted from the property per day resulting in vehicle movement approximately every 15 minutes. When necessary the haul road could also be watered down by means of a sprinkler system.

Vehicular emissions will be related to one excavator, one front-end loader and a number of trucks. People would not reside on the property; therefore smoke generated by cooking fires would not be a consideration. No waste would be burned on site. No other form of chemical air pollution is envisaged. No odours will be generated by the mining operation.

The overall impact on air quality is rated as insignificant (calm days) to low (windy days) considering the small-scale operation involved and the limited amount of people that might be affected. At closure, the disturbed area would be rehabilitated and would cause air quality to revert to original levels.

**Impact on air quality**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Local	Site Specific
<b>Duration</b>	Short Term	Short Term	Short Term
<b>Intensity</b>	Low	Low	Negligible
<b>Status</b>	Negative	Slightly Negative	Neutral
<b>Confidence</b>	High	High	High
<b>Significance</b>	Low	Very Low	Insignificant

Remedial measures to be implemented

- Vehicles to be maintained properly and fitted with standard exhaust systems and will not be left idling unnecessary.
- No cooking fires will be allowed on the property.
- No chemicals will be stored or disposed off on site.



- Waste will not be burnt on site. Waste will be retained in proper receptacles placed at the site and removed regularly to the waste site. The waste stream will be limited and be removed from site weekly to prevent odours from occurring.
- The mine will be developed in phases to reduce the extent of exposed areas.
- Topsoil will be reintroduced to mine areas as soon as possible and irrigated immediately after placement.
- The chemical toilet shall be regularly serviced as per Municipal guidelines.
- During periods of high winds and liberation of excessive dust volumes, disturbed areas will be watered down by means of a sprinkler system or water cart.
- No stockpiles will be retained for long periods in the mining area which could result in a source of dust.
- Handling of material during periods of high wind action will be avoided as far as possible if it leads to unacceptable dust generation. Should irrigation be ineffective during such adverse climatic conditions, quarry operations shall be halted. The management system will allow for monitoring the situation over weekends when no workers are on site.
- Speed of vehicles will be restricted to 40km/h.

## **Noise**

The impact of noise levels generated by mining activities is determined by the time of day, the consistency thereof, distance to people, whether it is a low or high-pitched noise and whether beneficiation is taking place. Noise levels are more intense in the morning and evening than during the rest of the day and are more irritating if it is high pitched. The more continuous the noise is the higher the impact. In terms of SABS standards noise levels for rural residential areas are 45dB during the day, 40dB in the early evening and 35dB at night. Noise impact is rated against the following: 1) The average person will be able to just detect a noise increase of 2dB, 2) An increase in noise levels between 2-5dB will result in no or sporadic complaints from communities whilst an increase between 5-10dB will result in widespread complaints, 3) An intruding noise is defined by National Noise Regulations as disturbing, if it causes the ambient noise levels at the border of the property from which it emanates to increase with 7dB, and 4) An average person will perceive such an increase in the ambient noise levels as a doubling of noise levels and very strong response will be expected from communities/residents.

The rural nature of the area involved would cause the ambient noise levels on average to be below 30dB. Taking into account that this is a farming community; a slight increase in noise levels during the day at the mine, would be acceptable. Noise levels at the boundary will not exceed 50dB.

Work over weekends may cause a noise nuisance and should be limited from 8 am to 1 pm on Saturdays, if market demands.

Seeing that no camp would be established on the mining area, no noise would be generated at night that could become a nuisance. Working hours would on average be from 7 am to 5 pm on weekdays, which would coincide well with the daily activities of the inhabitants of the area.

Adverse conditions such as low cloud cover or strong winds blowing towards recipients could increase noise levels between 3 & 7dB, but considering the distance to the closest residence, the impact is still rated of low significance.

No workers will be housed on the property therefore noise generated at night would not become a nuisance. Management of this impact during the day could be achieved via an environmental awareness programme. In addition, staff and contractors would be sensitized not to engage in unnecessary hooting, shouting, flapping of tailgates and use of exhaust brakes during operational hours. Maintaining speeds below 40km/h would assist in curbing noise impact. Exercising proper road etiquette is still vitally important to maintain low noise levels.

With the necessary mitigation measure in place, the all-over impact can be rated as intermittent and very low and should rather be rated as a nuisance.

### Noise Impact

	<b>OPERATIONAL with mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Local	Site Specific
<b>Duration</b>	Short Term	Short Term	Short Term
<b>Intensity</b>	Low	Low	Negligible
<b>Status</b>	Negative	Negative	Neutral
<b>Confidence</b>	High	High	High
<b>Significance</b>	Low	Low	Insignificant

### Remedial measures to be implemented

- All vehicles will be fitted with standard exhaust systems and be regularly serviced.
- Unnecessary hooting, shouting, flapping of tailgates and use of exhaust brakes will be discouraged and may be penalized where necessary.
- Unnecessary idling of vehicles will be discouraged.
- Travelling speed on the internal haul road will be reduced to 40km/h
- Normal working hours will apply for weekdays (7 am-6 pm in summer and 7.30 am-5 pm in winter) and Saturdays (8 am-1 pm) if necessary (will liaise with property owners) – No work on holidays or Sundays.
- Workforce and contractors will be properly managed in terms of noise generation and be informed on acceptable behaviour.
- Protective ear devices will be provided to all operators of machinery/vehicles generating noise above 50 dB at source.
- Vegetation screens outside the mine area will not be removed.
- No repairs on any vehicles where steel on steel actions are involved, shall be done before 8 am and after 5 pm.

### **WASTE GENERATION AND MANAGEMENT**

#### *Building rubble*

No construction activities will take place therefore no cement residue, brick residue, corrugated plate off-cuts, ceramic waste or PVC residue would be generated. There will be no office, workshop or crushing equipment on the mine area. At closure there will be no infrastructure to be removed.

No impacts on soils, water, vegetation, air quality and humans are anticipated.



### *Industrial waste*

Very little, if any, industrial waste will be generated and will be restricted to the odd tire casing and piece dysfunctional equipment, which will be removed from the property on a daily basis. No impacts on soils, water, vegetation, air quality and humans are anticipated.

### *Domestic waste*

The waste stream will consist mainly of domestic waste (food, bottles, plastic bags, paper, clothing, rags etc) and will be small and deposited in the containers provided for this purpose. Refuse bins will be clearly marked and placed at the entrance to the property and northern boundary of the study area to encourage workers to use them. Poor control over domestic waste handling could lead to littering the site and abutting properties and must be avoided since it could lead to livestock mortality or impacts on aquatic fauna. Due to the limited number of people anticipated on site, the limited waste stream will have negligible impacts on soils, water vegetation, air quality and humans.

### *Mine Residue*

Except for the topsoil, all material will be mined and no overburden will occur. Since no chemical processes, mineral processing or washing plant is required on site no chemical/mineral waste or effluent is generated.

The cumulative impact on soils, water quality, stream flow, vegetation, and aesthetics is rated of low significance.

### *Sewage system*

The sewage system will consist of a chemical toilet and due to the limited number of people on site, the effluent stream will be limited to approximately 0,1 m<sup>3</sup> per week and no impacts on soils, groundwater, surface water, air and humans are anticipated.

### *Hydrocarbons*

No hydrocarbon storage, transfers or handling will take place onsite. Servicing of equipment and vehicles would be done off site therefore no hydrocarbon waste such as used oil, lubricants and hydrocarbon-contaminated filters will be generated. Any such material generated during emergency repairs will be removed from site immediately.

No wash bay or oil trap will be constructed as vehicles will be washed off site and all hydrocarbon spills will be contained within large drip pans.

### *Salvage Yard / Scrap Metal*

Since the site will not host any plant, there is no need for spare parts and hence no scrap metal will be generated. In turn, no salvage yard will be required. All unusable equipment will on a daily basis be disposed of at an appropriate recycling facility. The impact on soils, water quality and aesthetics is rated very low.

At closure, any scrap metal and dysfunctional equipment that might be positioned onsite, will be sold to a commercial scrap yard. No post closure impact is anticipated.

**Impact of waste on environment**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Property	Site Specific
<b>Duration</b>	Short Term	Short Term	Short Term
<b>Intensity</b>	Low	Low	Negligible
<b>Status</b>	Negative	Negative	Neutral
<b>Confidence</b>	High	High	High
<b>Significance</b>	Low	Very Low	Insignificant

Remedial measures to be implemented

- The odd tyre casings and dysfunctional equipment that could be generated, will be disposed of immediately at the nearest registered waste facility.
- All machinery and waste, if any will be removed at closure.
- Any waste produced will be removed from the mine area on a continuous basis to the nearest waste facility with specific emphasis on household waste, plastics, unusable scrap metal and tire casings, if any.
- At closure, all waste will be removed from site.
- Vehicles may not leak any fuel, oil or lubricants and will be maintained to an acceptable standard offsite.
- Any fuel spills will be cleaned up immediately and the soil from spill areas to be removed to the waste disposal site.
- A chemical toilet will be placed at the quarry and it will be regularly serviced and emptied at an approved waste site. A Health Inspector should inspect the system and surrounds annually.
- Strict controls will be enforced to ensure that the surrounds are not used as ablutions and this aspect would be included in the environmental awareness programme.
- Domestic waste generated ancillary to the mining process will be deposited in containers with scavenger proof lids placed at quarry. It will be removed on a weekly basis from site to the nearest waste site and not dumped in the veld. Containers will be clearly marked to ensure that they are used for the right purpose. Management will provide clear management guidelines and this aspect will be included in the environmental awareness programme.
- Waste will not be burnt or buried on site.
- Staff will be equipped to distinguish between domestic waste and industrial waste.
- No day to day repairs or servicing of vehicles or equipment will take place on site.
- All hydrocarbon-contaminated material, including soil to be disposed of at a hazardous waste facility and the affected area bio-remedied by a specialist in case of any large spills.
- No washing of vehicles will take place on the property.
- Facilities will be maintained and kept neat on a continuous basis.
- Any unusable scrap metal or dysfunctional machinery on the property will be collected and removed on a monthly basis and the allocated storage space will fenced off and be earmarked for this purpose.
- At closure all remaining stockpiles will be flattened and reintroduced to disturbed quarry areas and all waste will be removed off site and disposed off in an appropriate manner.
- A general clean up of the property will be done on a weekly basis and before every year end closure and all personnel will be involved to establish a sense of pride in achieving a clean environment.



## **VISUAL/AESTHETIC IMPACT**

The quarry setting as described earlier constitutes large undulating hills with moderate slopes and flattish, table top areas. Visual impact of the proposed concern is limited due to its locality and the distance to the abutting residences.

It is anticipated that the clearing of vegetation and dust generation associated with this will not increase the visibility of the project, due to the topography and vegetation.

Mining will change the texture (vegetated/rough to bare/smooth) and colour (green/brown to whitish-grey) of the area will increase visibility moderately and necessitates that production areas be profiled, disturbed areas kept as small as possible, and re-vegetated concurrently with extraction activities is an absolute requirement. This impact will be temporary.

No infrastructure will be erected in the mining area that could result in visual intrusion.

Visibility from the air would be low since the site is not en route to any major airport. It nevertheless remains important that a phased rehabilitation approach should be followed to ensure that the minimum area is disturbed at any given time and that progressive rehabilitation takes place.

Stockpiles within the quarry would be low and not readily protrude above the original level of the land and will only equal one days' demand. It is not expected that it would cause the quarry operation to become more visible. Very little dust generation on the internal haul road will be experienced, resulting in only a limited visual dust plume to hang in the air above the road. The mining operation per se will liberate insignificant dust volumes into the air and the visual impact is rated of low significance.

### **Visual views**

Due to the low intensity operation, visual intrusion would be minimal and temporary within the surrounding landscape. In conclusion, the all-over visual impact can be rated low, but with the prescribed mitigating measures in place, the impact can be further reduced to negligible.

### **Visual impact**

	<b>OPERATIONAL Without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	Local	Local	Site Specific
<b>Duration</b>	Medium Term	Medium Term	Temporary
<b>Intensity</b>	Medium	Low	Negligible
<b>Status</b>	Negative	Slightly Negative	Positive
<b>Confidence</b>	High	High	High
<b>Significance</b>	Low	Very Low	Insignificant

### **Remedial measures to be implemented are:**

- No vegetation clearing will take place outside the proposed mine area during the mining operation.
- Reduce visual impact through proper re-vegetation.

- The proposed mine areas will be kept clean and free of litter on a continuous basis. A weekly clean up of the entire site will be done.
- No dumping of waste will be allowed on the property.
- Disturbed areas will be progressively developed and rehabilitated as indicated under 'quarry development'.
- The sides of the quarries will rounded off through a cut and fill action to create a minimum slope of 1:3.
- Cuts will follow curvilinear lines, which will blend in with those of the surrounding landscape, rather than straight geometric lines.
- Alien vegetation will be removed on a continuous basis to ensure that established natural vegetation is not out competed.
- Excessive dust plumes within the mine area or on the haul road, if any, will be eliminated through wetting.
- Visuals will be drastically improved at closure of the mining concern.
- At closure, all disturbed areas would have been rehabilitated as per the re-vegetation plan.

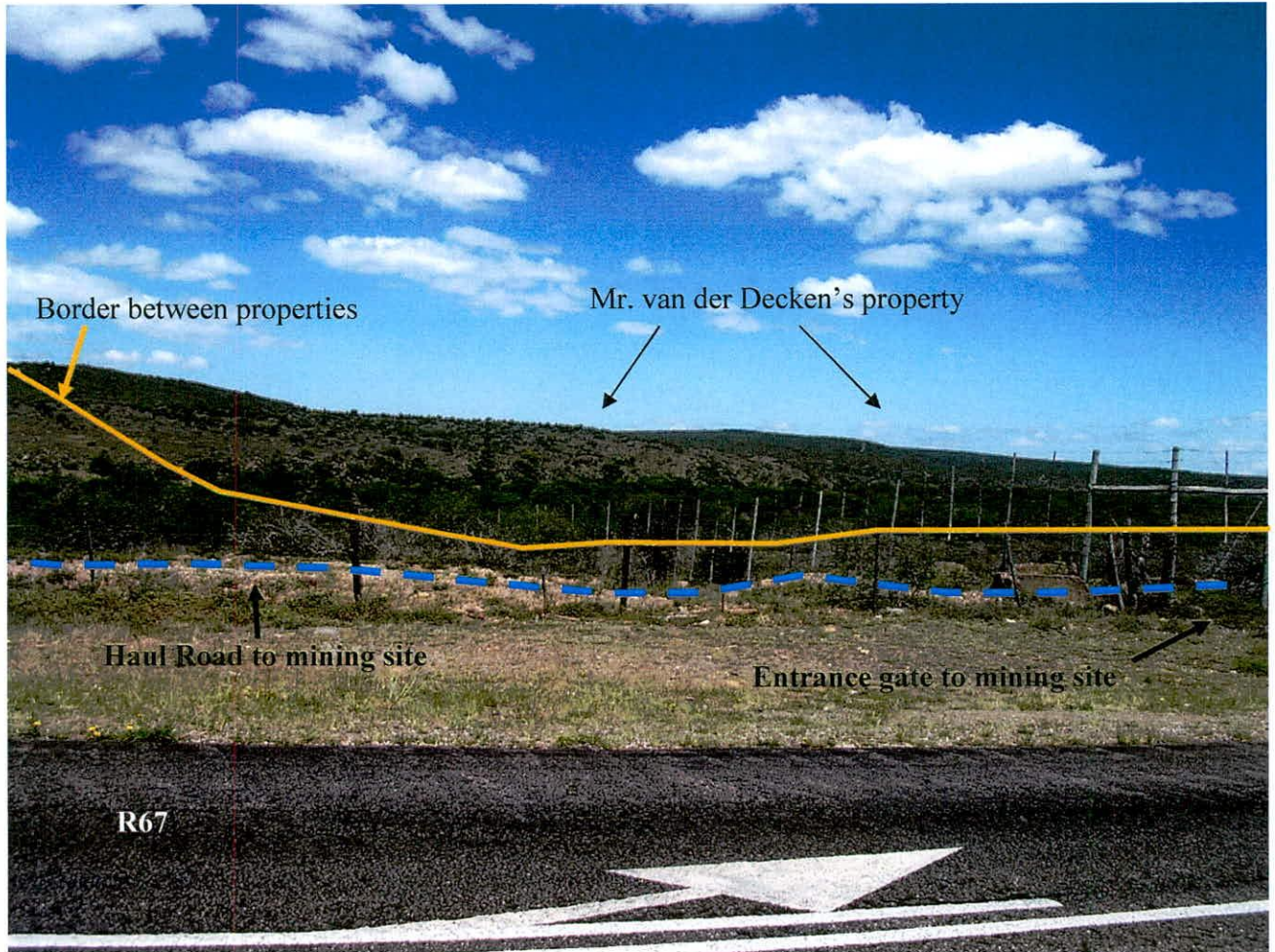
### **TRANSPORT IMPACT**

Material will be carted along the ±2km haul gravel road before it connects with the public road R67. The joining point of the gravel road to the R67 has to be well maintained and does not show any signs of degradation at this stage. The R67 is frequently used by farm owners and the general public travelling between Fort Beaufort and Grahamstown, and was designed for use by all types of vehicles, heavy vehicles included. The R67 does not have any shoulder and therefore entrance from the haul road should be performed with great care, especially when turning towards Fort Beaufort.

The haul road is not in use currently. The proposed activities at the quarry will lead to an increase of trucks utilizing the haul road and consequently the deterioration of the road surface, therefore upgrading is very important. As a minimum the haul road must be provided with cross drains and possible gravel layer. This can be done in consultation with the DRT. The cost thereof would be for the applicant.

A slight increase of traffic on the R67 might also be expected should mining increase production to double of which is estimated. However, as indicated previously, the production rate is going to be fairly small and therefore this impact is rated low to neutral on the R67, also keeping in mind that other heavy vehicles are also using this road which is not related to mining at all. Impact on the haul road can be rated as moderate, however if the road is upgraded and maintained, then this impact can rated as low.





The safety of road users should always be a priority and courteous road etiquette must be followed. The applicant must from the day of commencement of the activities ensure that regular meetings are held with the truck drivers and sub-contractors to address reckless driving and speeding.

The required heavy vehicle signs must be erected in conjunction with the DRT on both sides of the junction of the gravel road with the R67 to increase safety standards. This is an approved entrance road and the DRT should not have any objection to the continued use thereof. The line of visibility on the left hand side of the junction with the R67 is fairly good, but the visibility to the right hand side of the junction requires extra care because of a hill not too far from the junction. No direct threat to the road users are posed if the necessary mitigations are implemented, the drivers be cautious, adhere to road etiquette and abide by the speed limit.

In conclusion, road safety for motorists is of importance and truck drivers will be informed accordingly and be sensitized towards displaying proper road etiquette. The impact is therefore rated of low significance.



Visibility from junction towards Fort Beaufort



Visibility from junction towards Grahamstown



**Transport Impact**

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	District	District	District
<b>Duration</b>	Medium Term	Medium Term	Temporary
<b>Intensity</b>	Low-Medium	Low-Medium	Low
<b>Status</b>	Negative	Negative	Negative
<b>Confidence</b>	High	High	High
<b>Significance</b>	Moderate	Low	Low



Remedial measures to be implemented are:

- All vehicles will be properly maintained in accordance with Eastern Cape Roads Act 3 of 2003.
- All drivers will display the necessary road etiquette and dispose over applicable drivers licenses and this aspect will be included in the environmental awareness programme.
- No unnecessary hooting would be permitted.
- Vehicles entering the R67 road will come to a complete stop before entering the road and any transgressions in this regard will be heavily penalized. All contractors will sign a letter of agreement to this effect.
- All vehicles visiting the quarry shall be road worthy and will be included in the agreement with contractors.
- Overloading will not be permitted. Speeding will be prohibited and drivers will be penalized should it be proved that this requirement is contravened.
- Hauling of material will only mostly commence at 08:00 and ceases at 17:00. No vehicles may park along the road outside the mine area before or after the said times. It will be included in an environmental awareness programme.
- The appropriate signage (W107 & W108 –1,2m size) will be erected on both sides of the quarry entrance and access to R67 will be maintained in collaboration with the District Roads Engineer.
- The District Roads Engineer will be consulted on the maintenance of both roads to be used.
- Management shall ensure that no sand is deposited on the tar road that could impact on the safety of motorists.
- If poor visibility or slow access of vehicles onto the R67 could result in any accidents, a flagman will be used at the access.
- Internal haul road will be upgraded and maintained to an acceptable standard to prevent erosion and maintain safety standards.

**SOCIO -ECONOMIC IMPACT**

Increasing demand from the Fort Beaufort area for sand has been experienced and therefore the development of the quarry poses a significant financial benefit to the applicant, especially over the medium to long term. Since the site is located in a rural farm area property values will not be affected.

Establishing the quarry will provide for much more affordable construction and building material to construction companies, town residents but also residents of the rural areas that is progressively. This positive attribute together with the opportunity for a number of jobs at both the quarry and proposed brickyard in town culminate in a definite contribution to the upliftment of the residents in the area and to infrastructure development.

The establishment of the concern will have no negative impact on cultivation activities in general as the site is used as grazing area. The site is not located near any tourist vantage point or regularly visited by tourists therefore the impact on the local tourist industry is deemed negligible. The ‘sense of place’ may over the short term be affected by increased noise and dust pollution and the mitigation measures prescribed in the EMP, should be followed vigorously to reduce these potential impacts to acceptable levels. The potential of the concern to lure away farm workers due to possible higher wagers is not a consideration taking into account the high unemployment rate in the area and the limited number of jobs that will be created at the quarry.



Operational hours will be restricted to normal working hours and daytime therefore noise and light pollution at night is not a consideration. Dust generation will be effectively curbed as described earlier and should not pose a significant risk due to the distance to receptor points.

General socio-economic impact

	<b>OPERATIONAL without mitigation</b>	<b>OPERATIONAL with mitigation</b>	<b>CLOSURE</b>
<b>Extent</b>	District	District	District
<b>Duration</b>	Short Term	Medium Term	Short Term
<b>Intensity</b>	Very Low	Low	Very Low
<b>Probability</b>	Probable	Definite	Likely
<b>Status</b>	Positive	Positive	Positive
<b>Confidence</b>	Medium	High	Low
<b>Significance</b>	Very Low	Low-Moderate	Very Low

Remedial measures to be implemented are:

- Those described under previous headings plus establishing regular meetings with nearby neighbours.

**SITES AND STRUCTURES OF ARCHAEOLOGICAL AND CULTURAL INTEREST**

Archaeological and cultural sites represent the heritage of communities and are therefore protected in terms of current legislation. In addition all structures older than 60 years are protected. The study area revealed no caves, stone features, shelters or any rock art. The fact that the quarry area reveals thick layers of sand that have been deposited over many decades and the fact that the excavation will only be 2 – 4m deep, rules out the potential to find any archaeological deposits such as human skeleton material and shell middens. The area concerned is not rich in archaeological sites but since the mining site constitutes a highpoint in the landscape, it is anticipated that Stone Age tools and artefacts could possibly be found in the area. The same applies for the existence of Stone Age tools and artefacts.

It is the author’s opinion that the geological nature of the area would prevent the area to reveal any natural heritage or cultural sites and the impact of the proposed quarry is rated preliminary as insignificant. Due to the remote locality of the site and the vast adjoining tracks of similar vegetation, it would have very little value to local residents with regards to obtaining vegetation for medicinal purposes. Since the Khoisan and Xhosa people inhabited the study area historically and because the greater has revealed in the past some archaeological findings the following general rules will apply during the operational phase:

1. The operator of the excavator should be briefed regarding this aspect and a reporting channel must be developed.
2. Management will be informed when anything of interest is observed on the site and it will be reported immediately to Dr. Binneman at the Albany Museum in Grahamstown and SAHRA’s office in East London. In such case all operations would be suspended immediately.
3. Any finding will be fenced off immediately.



## **PUBLIC PARTICIPATION**

The setting of the land concerned is rural and surrounded by semi-transformed land divided into farms belonging to private owners. Current legislation (section 10 of the MPRDA) requires that interested and affected parties be consulted and as part of the public participation process the following steps were taken:

- As no landowner will be influenced because of the distance to any residences, it is not necessary to consult with any party.
- The DME will consult with Departments of Water Affairs, Agriculture and Environmental Affairs and The South African Heritage Resources Agency.

The sand quarry is located in a rural area that is sparsely populated, hence a low impact (except for the impact on transport and road), as discussed under social impact, is anticipated.

## **CONCLUSION**

The proposed quarry can be developed in a sustainable manner provided that the following requirements are met:

1. A phased approach must be followed and should the applicant not be able to rehabilitate phase 1 effectively operations at the quarry must be stopped.
2. Alien trees must be prevented from establishing in the mine area.
3. Surface water quality may not be compromised.
4. The Department of Minerals & Energy must provide the necessary guidance and monitoring and where applicable enforce environmental legislation.

The proposed quarry can meaningfully contribute to the building industry and economic growths of the region since in due time a crisis in terms of sand availability due to the dwindling reserves at other commercial concerns might be experienced. Since the quarry will be financially sustainable, it would provide ample finances for the rehabilitation process.

The amount calculated is required for the rehabilitation of environmental damage caused by the operation and makes provision for premature closure and worst-case scenario. This amount reflects the cost should the Department have to rehabilitate the area disturbed in case of liquidation or abscondence of the holder. In this regard it should be noted that only one quarry will be developed at a time and this serves as an undertaking to this effect.

**FINANCIAL PROVISION**

**Analysis of rehabilitation costs: Private rates**

**General**

Tendering process & advertisement = **R2500**

Transport of equipment = **R3000**

Supervision fees and reporting = **R7000**

Aftercare – erosion, alien eradication, seeding/planting and monitoring = **R10 000**

Closure documents = **R5000**

Contingencies = **R5000**

**Sub-Total = R32500**

**Mine area (Phase 1 )**

Cut and fill of production faces (1:3) 630m<sup>3</sup> @ R10/ m<sup>3</sup> = **R6300**

Profiling of quarry floor = **R2000**

Spreading of topsoil = 1125m<sup>3</sup> @ R8/ m<sup>3</sup> = **R9000**

Removal of waste, scrap metal and redundant equipment etc = **R1000**

Erosion control measures = **R4 000**

**Sub-Total = 22 300**

**Grant Total = R54 800**

A financial guarantee to the value of R25000 will be made available to the DME before approval. Four consecutive payments of R6250 each will be made available before commencing with ensuing phases. Should the applicant rehabilitate each phase concurrently with mining it is proposed that the additional payments are reduced to R5 000 each.

**UNDERTAKING: IMPACT ASSESSMENT**

I, C.Braun, declare that the above information in my opinion is true, complete and correct. I undertake to implement the remedial measures at the proposed quarry as described in all sections of this document. I understand that this undertaking is legally binding and that failure to give effect hereto will render me liable for prosecution in terms of Section 98 (b) and 99 (1)(g) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). I am also aware that the Regional Manager may, at any time but after consultation with me, request changes to this plan, as he/she may deem necessary.

Signed at \_\_\_\_\_ on the \_\_\_\_\_ day of \_\_\_\_\_ 2010

.....  
Signature of applicant



## **MONITORING AND PERFORMANCE ASSESSMENT**

### **Inspections and monitoring**

- Regular monitoring of all the environmental management parameters and implementation of required remedial measures shall be carried out to ensure that the provisions of this programme are adhered to.
- Ongoing and regular reporting of staff to Mr. C. Braun and to the DMR on the progress of implementation of this programme will be done.
- Various compliance areas will be identified with regard to the various impacts that the operations will have on the environment.
- Inspections and monitoring shall be carried out on a regular basis with specific emphasis on profiling of disturbed areas, re-vegetation progress, die-off of established vegetation and flood water control.

### **Compliance reporting / submission of information**

- Layout plans will be updated annually or should mining operations change drastically and updated copies will be submitted to the DME
- Any environmental emergency/accident will be reported immediately to DME and where applicable to DWEA.
- Should the assessment of environmental impacts in future be proved incorrect or should have impacts been unknown when the programme was compiled, then additional assessments shall be carried out and added as an amendment and where applicable a second opinion will be sought.
- All environmental hazards, unforeseen impacts identified, pollution incidents or environmental failures will be reported to the DME and other relevant Departments immediately.
- A six-monthly performance assessment will be compiled and submitted to the DME in June and December for evaluation and acceptance.
- Once extraction is completed a closure program will be compiled to ensure that rehabilitation will be completed as per the EMP and applicable environmental legislation.
- A final performance assessment report will be submitted at closure to ensure that all potential impacts are covered, that procedures followed were in line with the conditions of the management plan and that rehabilitation was completed in accordance to the management plan. Should any major shortcomings be detected then an amendment to the EMP/closure plan will be drafted and submitted for approval by the DME.

### The following site specific monitoring will be executed:

- An environmental monitoring checklist should be developed immediately after approval to facilitate a formal assessment process. It should be in line with environmental matters addressed in the EMP.
- The entire quarry will be monitored on a weekly basis until closure is granted.
- The mining/rehabilitation activities will be regularly visited by the holder/manager to ensure that mining is taking place within approved boundaries and that no erosion or dumping of waste on unauthorised areas are taking place on site.
- That vegetation cover and species diversity is adequate.
- All plants, if any, that can be safely transplanted are removed to disturbed areas.

- Transplanted plants, if any, are irrigated on a regular basis.
- The minimum vegetation is removed ahead of the mining face.
- Re-vegetation process is successful and that alien vegetation is removed.
- The area will be regularly visited by the holder/manager to ensure that the handling of hydrocarbons is according to approved guidelines and that the necessary precautionary measures for spills are adequate.
- General waste is handled correctly and effectively removed from the property.
- Dust control on the road at the quarry is effective to limit air pollution.
- That the mine is clean and tidy.
- Should any remedial measure fail, it will be adapted to suit circumstances or alternatives would be found in conjunction with the officials in affected Departments or with private experts.
- An environmental awareness programme will be introduced to make employees and contractors aware of EMP requirements.
- Should serious environmental misconduct by workers occur, the specific activity would be stopped until the problem has been remedied and financial penalties will be imposed.

### **REHABILITATION SCHEDULE**

#### Quarry

1. Profiling of phase 1 – continuous with mining and completed before commencement of phase 2. The same sequence will apply to ensuing phases.
2. Reseeding of phase 1 must be completed before commencement of phase 3; the same sequence will apply to ensuing phases. Reseeding of phase 4 to be completed within 6 months after completion of mining.
3. Submit a closure plan & risk assessment three months before mining operations are to cease.
4. Aftercare/maintenance – Two years after rehabilitation was successfully completed.

#### General

1. Quarterly eradication of alien vegetation until closure certificate is issued
2. Light application of fertilizers in March and September for duration of mining, rehabilitation and aftercare phases.

### **CLOSURE OBJECTIVES**

Closure objectives will be based on the following:

1. identify the key objectives for mine closure to guide the project design, development and management of environmental objectives;
  2. provide broad future land use objective(s) for the site; and
  3. provide proposed closure cost
- The mine area will be rehabilitated back to a sustainable grassland environment.
  - Production faces' of the quarry will be profiled to 1: 3 slopes by cut & fill method with the top edge rounded off to create a flowing landscape.



- Faces will be profiled in such a manner that soft lines are created and sharp corners are prevented in order to blend the quarry with surrounding landscape.
- The rehabilitated area will be kept clear of alien and invasive plant species.
- The area would be litter free.
- There will be no remaining stockpiles, equipment, waste, scrap metal/redundant equipment left at the site.
- Hydrocarbons, and contaminated soil, if any, will be safely removed from site.
- Safe drainage of the mine must be achieved without causing erosion.
- Some animals will be able to return safely to the site
- The mining sites will not become prone to unauthorised dumping.
- The proposed land-use will be achieved within 1 year after rehabilitation has been completed.
- Nearby residents will not be subjected to any post closure social or environmental impacts.

### **CONTENTS OF CLOSURE PLAN**

Closure would be affected by the submission of the following documents to the DME 90 days before cessation of mining activities.

- An application for closure form,
  - A risk assessment,
  - A closure plan
  - Once the site is rehabilitated a final performance assessment will be done
- 
- (a) a description of the closure objectives and how these relate to the mine operation and its environmental and social setting;
  - (b) a plan contemplated in Regulation 2(2), coordinated according to generally accepted standards, showing the land or area under closure;
  - (c) a summary of the regulatory requirements and conditions for closure negotiated and documented in the environmental management programme or plan;
  - (d) a summary of the results of the environmental risk report and details of identified residual and latent impacts;
  - (e) a summary of the results of progressive rehabilitation undertaken;
  - (f) a description of the methods to decommission each mining component and the mitigation or management strategy proposed to avoid, minimize and manage residual or latent impacts;
  - (g) details of any long-term management and maintenance expected;
  - (h) details of financial provision for monitoring, maintenance and post closure management, if required;
  - (i) a plan or sketch at an appropriate scale describing the final land use proposal and arrangements for the site;
  - (j) a record of interested and affected persons consulted; and
  - (k) technical appendices, if any.

The end-state of the mining area would be consulted with interested and affected parties in terms of Regulation 52(2)(g).

The holders of the permits will be liable for any environmental damage or degradation emanating from his operation, until a closure certificate is issued in terms of Section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

## **AFTERCARE**

It is anticipated that the following aftercare will be provided over one year:

- Vegetation cover – reseeds bare areas. – September to March
- Stability of production faces – Reshape affected areas, compact - May to August - Seeding done as from September to March
- Eradication of alien vegetation – Quarterly

## **POST CLOSURE MAINTENANCE**

Considering that the spoil is marginal and re-vegetation could be unsuccessful; post closure maintenance could be required. In order to provide the necessary funds for this task the following funds need to be secured:

Eradication of invasive vegetation = R2000 per annum x 2 year = **R4000**

Infill of any erosion gullies – **R5000**

Seeding and fertilizer– **R2500**

**Total = R11500**

## **POST CLOSURE AESTHETIC ACCEPTABILITY**

The quarry area will resemble a depression with 2-4 m high faces reflecting gentle gradients. Provided that a proper re-vegetation phase has been followed, the proposed mining activities would result in shallow depression. The floor of the quarry would still resemble the slope of the area prior to mining. A successful re-vegetation process would see the area reverts back completely to its original status as a functional grazing area.

## **LEGAL PROVISIONS**

Compliance with the provisions of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and its Regulations does not necessarily guarantee that holder is in compliance with other Regulations and legislation. Other legislation that will be observed includes, but are not limited to:

- \* National Monuments Act, 1969 (Act 28 of 1969).
- \* National Parks Act, 1976 (Act 57 of 1976)
- \* Environmental Conservation Act, 1989 (Act 73 of 1989)
- \* National Environmental Management Act, 1998 (Act No. 107 of 1998)
- \* Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965)
- \* The National Water Act, 1998 (Act 36 of 1998)
- \* Mine Safety and Health Act, 1996 (Act 29 of 1996)
- \* The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).



I, Mr. C. Braun, take cognisance of the following penalties should I transgress any section of the MPRDA or any other Act governing any other activity on the two quarry sites or any condition of the EMP and will abide thereby.

<b>Section of Act</b>	<b>Penalties for failure to comply with the provisions of the MPRDA 28 of 2004</b>	<b>Penalty in terms of Section 99</b>
5(4)	No person may prospect, mine, or undertake reconnaissance operations or any other activity without an approved EMP, right, permit or permission or without notifying land owner	R 100 000 or two years imprisonment or both
19	Holder of a Prospecting right must: lodge right with Mining Titles Office within 30 days; commence with prospecting within 120 days, comply with terms and conditions of prospecting right, continuously and actively conduct prospecting operations; comply with requirements of approved EMP, pay prospecting fees and royalties	R 100 000 or two years imprisonment or both
20(2)	Holder of prospecting right must obtain Minister's permission to remove any mineral or bulk samples	R 100 000 or two years imprisonment or both
<b>Section of Act</b>	<b>Legislated Activity/ Instruction/ Responsibility or failure to comply</b>	<b>Penalty in terms of Section 99</b>
26(3)	A person who intends to beneficiate any mineral mined in SA outside the borders of SA may only do so after notifying the Minister in writing and after consultation with the Minister.	R 500 000 for each day of contravention
28	Holder of a mining right or permit must keep records of operations and financial records AND must submit to the DG: monthly returns, annual financial report and a report detailing compliance with social & labour plan and charter	R 100 000 or two years imprisonment or both
29	Minister may direct owner of land or holder/applicant of permit/right to submit data or information	R 10 000
38(1)(c)	Holder of permission/permit/right MUST manage environmental impacts according to EMP and as ongoing part of the operations	R 500 000 or ten years imprisonment or both.
42(1)	Residue stockpiles must be managed in prescribed manner on a site demarcated in the EMP	A fine or imprisonment of up to six months or both
42(2)	No person may temporarily or permanently deposit residue on any other site than that demarcated and indicated in the EMP	A fine or imprisonment of up to six months or both
44	When any permit/right/permission lapses, the holder may not remove or demolish buildings, which may not be demolished in terms of any other law, which has been identified by the Minister or which is to be retained by agreement with the landowner.	Penalty that may be imposed by Magistrate's Court for similar offence
92	Authorised persons may enter mining sites and require holder of permit to produce documents/ reports/ or any material deemed necessary for inspection	Penalty as may be imposed for perjury
94	No person may obstruct or hinder an authorised person in the	Penalty as may be

	performance of their duties or powers under the Act.	imposed for perjury
95	Holder of a permit/right may not subject employees to occupational detriment on account of employee disclosing evidence or information to authorised person (official)	Penalty as may be imposed for perjury
All sections	Inaccurate, incorrect or misleading information	A fine or imprisonment of up to six months or both
All sections	Failure to comply with any directive, notice, suspension, order, instruction, or condition issued	A fine or imprisonment of up to six months or both

**ACKNOWLEDGEMENTS**

Department of Water Affairs – Environmental Data  
 Department of Environmental Affairs – Environmental data  
 Department of Water Affairs – Environmental Data  
 SM Pierce & AD Mader - STEP Handbook  
 Department of Environmental Affairs and Tourism: National Biodiversity Strategy and Action Plan  
 JoVic Environmental Services  
 Eastern Cape State of the Environment Report  
 Council for Geoscience



**UNDERTAKING**

I, C. Braun, the undersigned, have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein, including the conditions of approval as stipulated by the Regional Manager.

Signed in \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_ 2010

.....  
Signature of applicant

**APPROVAL**

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 29 of 2002)

Signed at Port Elizabeth on this \_\_\_\_\_ day of \_\_\_\_\_ 2010

.....  
REGIONAL MANAGER  
EASTERN CAPE

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