

Figure 4.5b Regional Vegetation within and Surrounding the Study Area - Section 2

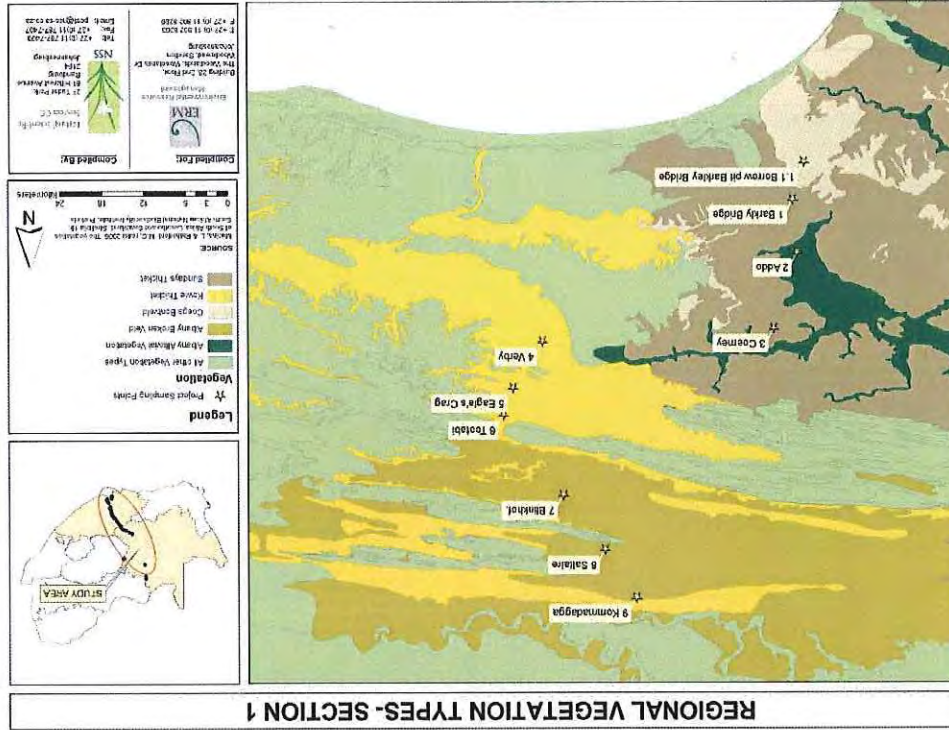


Figure 4.5a Regional Vegetation within and Surrounding the Study Area - Section 1

Figure 4.5c Regional Vegetation within and Surrounding the Study Area – Section 3

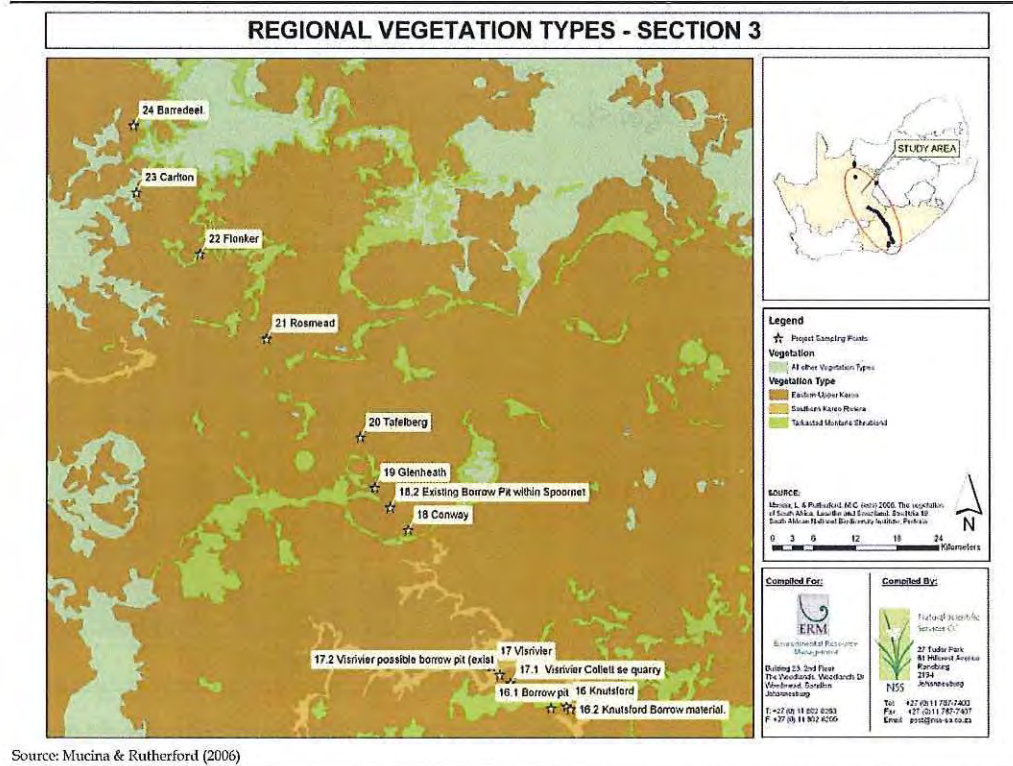
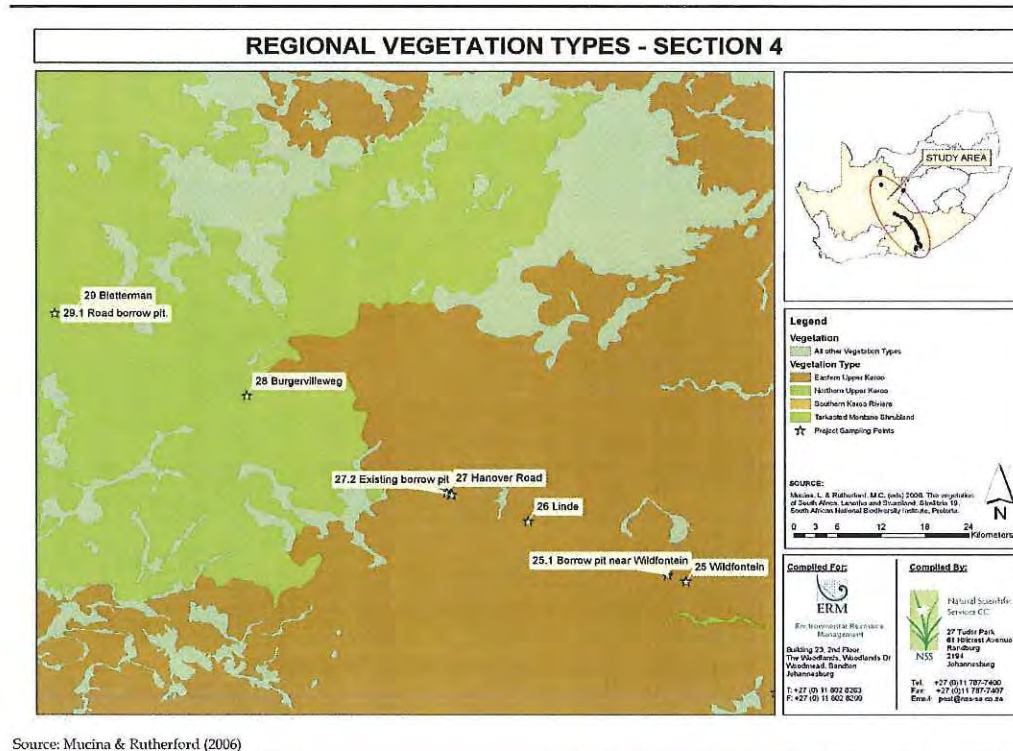


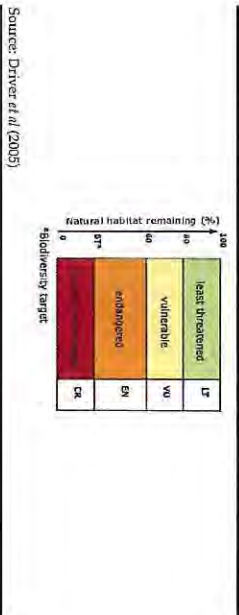
Figure 4.5d Regional Vegetation within and Surrounding the Study Area – Section 4



4.6 VEGETATION CONSERVATION STATUS
4.6.1 National Level

Ecosystem status is based on how much of an ecosystem's original area remains intact, relative to three different thresholds based on best available science (Figure 4.6.1) (Driver *et al.*, 2005). Note that the threshold beyond which an ecosystem becomes critically endangered varies from 16% to 36%, depending on the ecosystem. The more species-rich the ecosystem, the higher the threshold. This threshold is also known as the biodiversity target. It represents the proportion of each ecosystem one would ideally like to see included in a formal protected area.

Figure 4.6.1 NSBA Terrestrial Ecosystem Status



Source: Driver *et al.* (2005)

According to Mucina and Rutherford (2006) and the terrestrial component of the NSBA (Driver *et al.*, 2005), the ecosystem status at a national level for each of the vegetation sites relevant to the study area are listed in Table 4. below.

Table 4.6.1 Vegetation Types, their Ecosystem Status and Potential Threats

Vegetation Type	Ecosystem Status	Conservation Target	Threats
<i>Cogea</i> Bushveld	LT	19%	Cultivation and urbanization.
Sandgys Thicket	LT	19%	Cultivation, urbanization and grazing by livestock
Koarie Thicket	LT	19%	Mainly Cultivation
Albany Broken Veld	LT	16%	Mainly Cultivation
Albany Alluvial Vegetation	EN	31%	Cultivation, urban development, road building and plantations
Great Fish Thicket	LT	19%	Cultivation and urbanization.
Southern Karoo River	LT	24%	Cultivation and building of dams, frequent disturbance (floods, concentrated grazing pressure), and associated input of nutrients, increase vulnerability to invasion of alien woody species
Eastern Upper Karoo	LT	21%	Cultivation and building of dams
Tarkastad Montane Shrubland	LT	29%	Cultivation and building of dams
Northern Upper Karoo	LT	21%	Cultivation, building of dams, human settlements and Alien invasion
Kimberley Thornveld	LT	16%	Cultivation
Karuman Thornveld	LT	16%	Grazing
Kathu Bushveld	LT	16%	Grazing, Mining

Source: Mucina & Rutherford (2006)

• LT = Least Threatened; EN = Endangered

The Albany Alluvial Vegetation is the only vegetation type on a national level that is considered threatened and has an Ecosystem Status of Endangered (Figure 4.6.1a). The Addo passing loop (Site 2) falls within this vegetation type. The target for conservation is 31%. According to Mucina and Rutherford (2004) about 6% is statutorily conserved in the Greater Addo Elephant National Park, Bavianskloof Wilderness Area, Loeie Dam, Springs, Swartkops Valley and Yellowwoods Nature Reserves and the Double Drift Reserve Complex. About 2% is protected in eight private conservation areas.

Furthermore according to the NSBA (Driver *et al.*, 2005) nine of the sites towards the south fall within the Priority Areal: *Albany Thicket and Wild Coast* (Figure 4.6.1b). Out of the 9 national Priority Areas, the Albany Thicket is ranked 6th in terms of future pressures on biodiversity.

(1) The NSBA derived 9 priority areas within South Africa based on the systematic analysis of genetic, ecosystem and ecological processes. Areas with high scores were grouped according to topography and biome boundaries

4.6.2

Provincial/Municipal Level

At a Provincial / Municipal level, there is only one programme that has highlighted the conservation status of vegetation or habitats types. This programme is based in the Eastern Cape and is known as the STEP programme. According to Pierce & Mader (2006), it identifies a number of threatened habitats. These include:

- *Stimdiys Spekboom Thicket*
 - Sites 1: Barkly Bridge
 - Site 3: Coerney
- *Stimdiys Doring Veld*
 - Site 2: Addo
- *Fish Spekboom Thicket*
 - Site 10.1: Road borrow pit near Cookhouse
 - Site 10.2: Cookhouse possible borrow pit

These habitats above are recognised as Vulnerable (Figure 4.6.2). They are ecosystems that cover much of their original extent but where further disturbance or destruction could harm their health or functioning. These ecosystems can withstand only limited loss of natural area through disturbance or development.

At the time of the compilation of this report no programmes for the Northern Cape section of the study area were available.

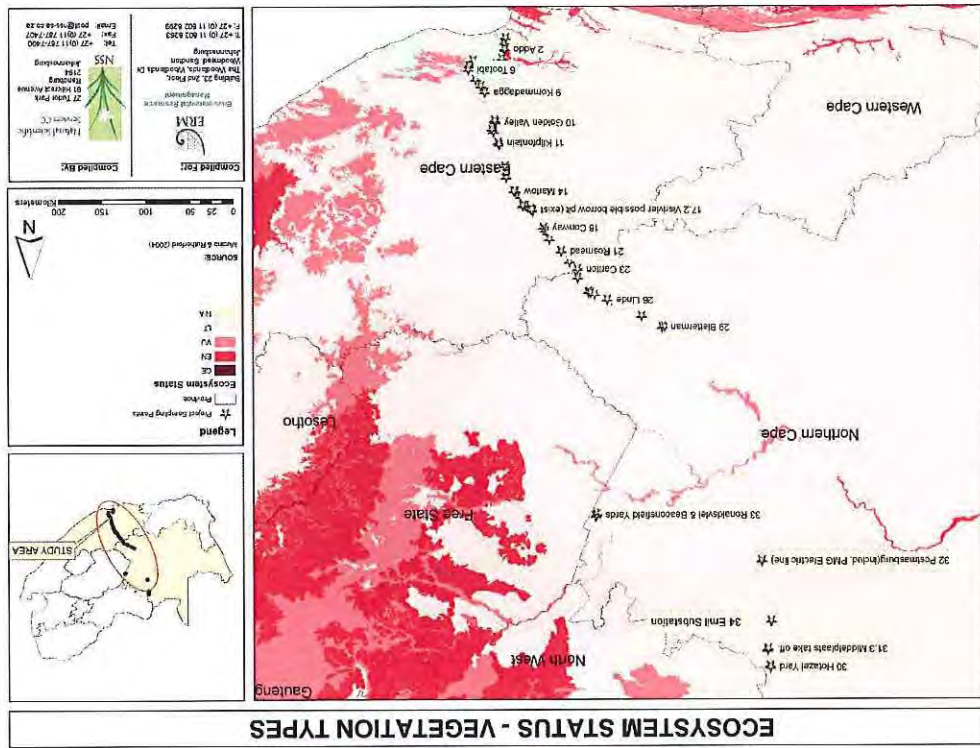


Figure 4.6.1a Ecosystem Status within and Surrounding the Study Area

Source: Mucha & Rutherford (2006)

Figure 4.6.1b Priority Zones within and Surrounding the Study Area

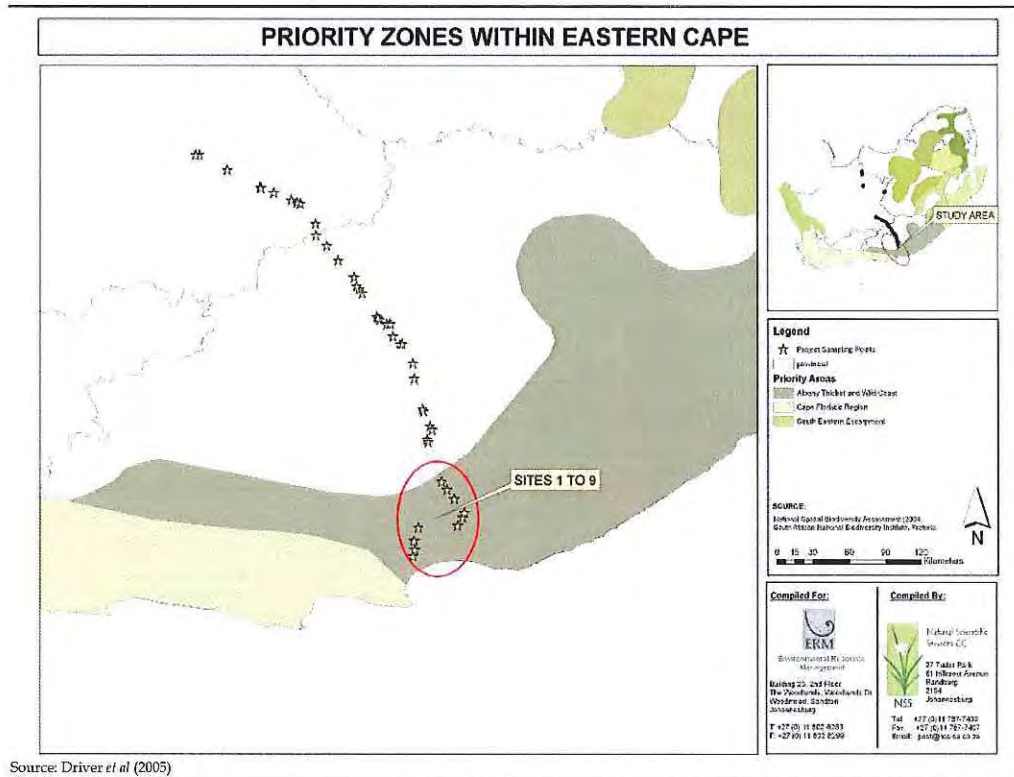
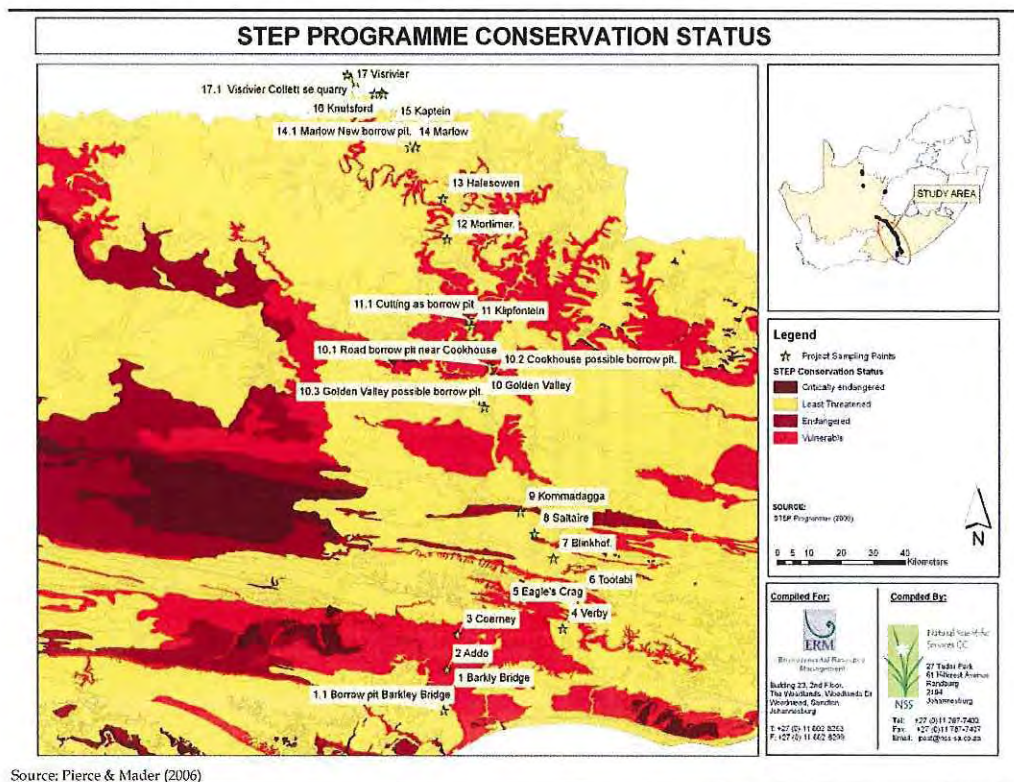


Figure 4.6.2 Ecosystem Status for a number of the Eastern Cape Sites at a Provincial/ Municipal Level



5 DESCRIPTION OF THE AFFECTED ENVIRONMENT - SITE SPECIFIC INFORMATION

5.1

1. BARKLY BRIDGE

5.1.1 Flora

The site was confined to the Sondagsvivier Valley and corresponded to soils that were derived from alluvial (Quaternary) deposits such as sand and limestone. Structurally, the vegetation was reminiscent of disturbed thicket comprising of decumbent, sprawling forbs and Asteraceous shrub with a well-developed graminoid layer. However, the grassy layer was poor in species richness, and was dominated by *Panicum schinzii*. The woody layer was represented by short, spinescent shrubby taxa. Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invader: Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Portulacaria afra</i> (d), <i>Lycium cherson</i> (d), <i>Acanth matthi</i> , <i>Cynanchum ellipticum</i>	<i>Lamprimitius prodrachis</i> (d), <i>Albica</i> cf. <i>setosa</i> , <i>Asparagus capensis</i> , <i>Milephora</i> sp., <i>Drosanthemum hispidum</i> , <i>Senecio latifolius</i> , <i>Pseudogymphidium madidatum</i>	<i>Panicum schinzii</i> (d), <i>Cynodon dactylon</i> , <i>Melinis repens</i> , <i>Stipa dreggana</i>
Taxa of Conservation interest:	Mesembryanthemaceae (<i>Delosperma</i> sp., <i>Drosanthemum hispidum</i> , <i>Malaphora</i> sp.) - PP	
Ecological importance:	Low - disturbed with early-successional composition * Although the site has a Low Ecological Importance it does fall within the Sundays Spekeboom Thicket, which is a threatened habitat.	
(d) - dominant taxa		
PP - Protected plant, as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974		

5.1.2 Fauna

Within the vicinity of the proposed loop expansion site there were citrus plantations, dwellings and open disturbed fields. These existing disturbances in the area are likely factors contributing to the limited faunal activity. Nineteen bird species, including Burchell's Coucal (*Centropus burchellii*), Karoo Prinia (*Prinia maculosa*) and Red-headed Finch (*Amadina erythrocephala*), were

observed at the site. For a complete list of bird species refer to Appendix A. Evidence of the presence of Small Grey Mongoose (*Citellus pultzeri*) was also observed adjacent to the railway reserve. No Red Data species were observed on site. The construction of the loop extension at Barkly Bridge is unlikely to cause any major disturbance to fauna in the area when taking into account the existing disturbances.

5.2

1.1 BARKLY BRIDGE BORROW PIT

5.2.1 Flora

The site corresponded to an existing borrow pit colonised by many pioneer and secondary plant taxa. However, the vegetation of the immediate surroundings was particularly rich and can be described as a mosaic of low thicket and bush clumps interspersed by short, open grassland on lime-rich clayey soils (Alexandria Formation). It represents a fine example of Albany Thicket (more precisely Coega Boniveld) with a high propensity towards succulence as exhibited by the families Apocynaceae (*Crassula*, *Cotyledon*), Asphodelaceae (*Aloe*, *Bulbine*, *Haworthia*), Crassulaceae (*Crassula*, *Cotyledon*), Mesembryanthemaceae (*Rhombophyllum*, *Ruschia*, *Delosperma*) and lastly Asteraceae (*Senecio*). Floristic endemism is believed to be high since many of the residing taxa have Fynbos, Grassland and Succulent Karoo links, all of them reaching their eastern and southern biogeographical limits here. Exotics include the highly invasive *Opuntia ficus-indica* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Euclea madidata</i> (d), <i>Gynnospora capitata</i> (d), <i>Olea europaea</i> subsp. <i>afriana</i> , <i>Curtisia hispidula</i> subsp. <i>hispidula</i> , <i>Dietspaae pallens</i> , <i>Croton robusta</i> , <i>Hippobromus pinnatifidus</i> , <i>Rhus incisa</i> , <i>Schoelia afra</i> var. <i>afra</i> , <i>Aloe</i>	<i>Becium burckellianum</i> (d), <i>Disparago</i> cf. <i>ericoides</i> , <i>Asparagus struthis</i> , <i>Asparagus</i> cf. <i>capensis</i> , <i>Cobyledon orbiculata</i> , <i>Crassula mucosa</i> , <i>Pachypodium bispiratum</i> , <i>Senecio radicans</i>	<i>Cynodon dactylon</i> (d), <i>Digitaria argyroglossa</i> , <i>Stipa argreana</i> , <i>Heteropogon contortus</i>

jevo, *Mystrocyon nethlopticus*

Taxa of Conservation interest:	Taxa of Conservation interest:
<i>Sideroxylon thurme</i> - DWAF protected?	
<i>Euclea trinacra</i> - BIT	
<i>Rhomphoglyphum rhomboidum</i> - En, NT (TSP, 2007), PP	
<i>Euphorbia meliogramis</i> subsp. <i>valida</i> - Rare (TSP, 2007), NT (Victor & Dold, 2003), PP	
Mesembryanthemaceae (<i>Carpobrotus edulis</i> , <i>Delosperma rogersii</i> , <i>Mesembryanthemum albidus</i> , <i>Ruscchia hantania</i> , <i>Ruscchia</i> sp., <i>Trichodactena bulbosum</i> , <i>Drosanthemum</i> sp.) - PP	
<i>Hemorthia attenuata</i> - PP	
<i>Alve hantils</i> - PP	
<i>Pachypharium hispanicum</i> - PP	
<i>Carpobrotus edulis</i> - Med	

Ecological importance: High - high species richness with endemic taxa and range-restricted taxa

- (d) - dominant taxa
 BIT - Biogeographically important taxon reaching the eastern limit of its distribution (Mucuna & Rutherford, 2006)
 En - Endemic to Coega Botveld
 NT - Near-threatened (according to IUCN listing criteria)
 PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
 Med - Valued medicinal plant (Van Wyk *et al.*, 1997)

5.2.2 Fauna

Barkly Bridge borrow pit is an existing borrow pit, however, faunal activity adjacent to the existing pit is relatively high. Evidence of fauna includes:

Figure 5.2.2 Faunal evidence



During the field investigations 21 bird species, four mammal species and two reptile species were observed or evidence of their presence was observed in the vicinity of the existing borrow pit. Examples of these species include: Brimstone Canary (*Serinus arrogans*), Cape Bunting (*Emberiza capensis*),

(1) * This species is listed on the national list of declared protected rare species as promulgated by the National Forests Act, 1998 (No. 94 of 1998) in terms of the National Forests Act of 1998, these rare species may not be cut, damaged, destroyed, and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Water Affairs and Forestry

5.3

Spinebok (*Raphicercus campestris*), Grey Ducker (*Sylvia curruca*) and Spotted Harlequin Snake (*Homonosclipsis lacteus*). For a completed list of species refer to Appendix A. No Red Data species were observed on site. The use of the existing borrow pit at Barkly Bridge will result in further loss of habitat, within the immediate surroundings, which supports an abundance of faunal species.

2. ADDO

5.3.1 Flora

The site was confined to the Sondagsrivier Valley and corresponded to soils that were derived from alluvial (Quaternary) deposits such as sand and limestone. Structurally, the vegetation was reminiscent of low thickets comprising of many spinescent shrub dominated by *Acacia natalitia* and *Aspirtigis affinis* and succulent shrub such as *Pottlicaria affra*. Many of the taller woody species were pre-disturbance Albany Thicket relicts, and were dominated by members of the Fabaceae (*Acacia*), Anacardiaceae (*Rhus longispina*), Celastraceae (*Gymnosporia*), Salvaadoraceae (*Azima tetraclitoides*) and Solanaceae (*Lycium*). Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invader: Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia natalitia</i> (d), <i>Lycium</i>	<i>Albica g'scraea</i> (d), <i>Aspirtigis affinis</i> (d), <i>Portulacaria affra</i>	<i>Cynodon dactylon</i> , <i>Sporobolus iodatus</i>
(d), <i>Azima tetraclitoides</i> , <i>Gymnosporia capitata</i> , <i>Rhus longispina</i> , <i>Sidaea affra</i> var. <i>affra</i>	<i>Jussiaea cf. pedicularis</i> , <i>Bulbocacis frutescens</i>	

Taxa of Conservation interest: *Mulophorum* sp. - PP

Ecological importance: Medium - high anticipation of vegetation destruction within the railway reserve.
 * The site also falls within the Sundays Doring Veld, which is a threatened habitat.

- (d) - dominant taxa
 PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.3.2 Fauna

The proposed loop expansion site is in the vicinity of the town of Addo, which is the likely factor causing limited faunal activity. During the field investigations only 13 bird species were recorded on site. Some of these species included Cape Weaver (*Ploceus capensis*), Malachite Sunbird (*Nectarinia famosa*) and Red-fronted Tinkerbird (*Pogonottilis pusillus*). For a complete species list refer to Appendix A. No Red Data species were observed on site. The construction of the loop extension at Addo is unlikely to cause any major disturbance to fauna in the area when taking into account the existing disturbances.

5.4

3. COERNEY

5.4.1 Flora

The proposed study area falls within the ambit of the railway servitude and was floristically ascribed to be a perturbed system dominated by pioneer and secondary graminoid taxa. The study area formed part of an ecological type known as the Sundays Thicket, which in a natural state, was covered by tall, dense thickets comprising of asept dominant species such as *Eriophoria grandiflora*, *Aloe africana* and *A. ferax*. This was clearly illustrated within the Addo National Park, which formed the eastern boundary of the railway reserve. The relic floral composition comprised of short spinescent shrub on mudstone-derived soils (of the Sundays Formation). Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invader: Category 2) and *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Portulacaria afra</i> (d), <i>Gymnosporia capitata</i> (d), <i>Azara tetragamithe</i> , <i>Lycium chereum</i> , <i>Plumbago articulata</i> , <i>Capparis sepiaria</i> , <i>Scleria afravor. affa</i> , <i>Rhacocarpus digitata</i> , <i>Grewia robusta</i> , <i>Ehretia rigida</i>	<i>Albica cf. senosa</i> (d), <i>Bulbine frutescens</i> (d) <i>Asparagus cf. capensis</i> , <i>Emex australis</i> , <i>Sansoneria aethiopicum</i> , <i>Eriophorin mauritanica</i> , <i>Scotia nigriflora</i>	<i>Cynodon dactylon</i> (d), <i>Panicum schinzii</i> , <i>Eriogonis carolin</i>
Taxa of Conservation interest: <i>Drosera</i> spp., <i>Leucophaea</i> sp., <i>Lampranthus prostratus</i> - PP		

Ecological importance:

Low

* Although the site has a Low Ecological Importance it does fall within the Sundays Spekboom Thicket, which is a threatened habitat.

(d) - dominant taxa

PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974.

5.4.2 Fauna

Although the Addo Elephant National Park forms the eastern boundary to the railway reserve limited faunal activity was observed at the site, which was likely due to the high level of disturbance to the vegetation. Species recorded in the vicinity of the site included Cape Turtle Doves (*Streptopelia capicola*), Bokmakierie (*Troglodytes aedon*) and Vervet Monkeys (*Cercopithecus nictitans*). No Red Data species were observed on site. The construction of the loop extension at Coerney is unlikely to cause any major disturbance to fauna in the area provided construction activities remain within the railway reserve and existing disturbed areas.

5.5

4. VERVÉ

5.5.1 Flora

The proposed study area was surrounded by orchards and anthropo-maintained secondary grassland that was primarily utilised for grazing purposes. However, the study area comprised of secondary graminoid taxa applied to counter the possible erosion of the existing railway cuttings. The remainder of the study area comprised of secondary herbs and woody lianas that were relicts of the regional vegetation type, namely Kowie Thicket. Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invader: Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
	<i>Helichrysum dreggmannii</i> , <i>Jasminum angulare</i> , <i>Cynanchum ellipticum</i> , <i>Coblydon orbiculata</i>	<i>Panicum schinzii</i> (d), <i>Bromus pectinatus</i> , <i>Hordeum maritimum</i>
Taxa of Conservation interest: None		
Ecological importance: (d) - dominant taxa		

PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.5.2 Fauna

Open fields used predominantly for grazing of livestock formed the majority of the landscape surrounding the proposed loop expansion site, which limited the availability of natural habitat for faunal species. During the field investigations 17 bird species were observed in the vicinity of the site, these included African Firefinch (*Lagonosticta rubricata*), Black-headed Heron (*Ardea melanocephala*) and Black-headed Oriole (*Oriolus chinensis*). For a complete list of species refer to Appendix A. Vervet Monkeys (*Chlorocebus adustus*) were also observed in close proximity to the site. The construction of the loop extension at Verby is unlikely to cause any major disturbance to fauna in the area when taking into account the existing disturbances.

5. EAGLES CRAG

5.6.1 Flora

The proposed study area coincided with the Bushman's River Valley that was bordered by dense Kowie Thicket and agricultural land. The Kowie Thicket comprised of low shrub with a thick understorey of succulent forbs and geophytes, while the existing railway loop comprised of post-disturbed grassland. The floristic composition of this area was more diverse in comparison to the previous sites, with *Aloe speciosa* replacing *A. affinis*. Exotics were represented by localised groves of tall *Eucalyptus amandulensis* (Invasive: Category 2) and *Opuntia ficus-indica* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia mearnsii</i> (d), <i>Ehretia rigida</i> (d), <i>Azima terraealba</i> (d), <i>Plumbago auriculata</i> (d), <i>Aloe speciosa</i> , <i>Diospyros molleis</i> , <i>Lycium charenum</i> , <i>Pogonopus capensis</i> , <i>Cordia alliodora</i>	<i>Baccharis burckeldiana</i> (d), <i>Euphorbia nanariflora</i> , <i>Blechnum capensis</i> , <i>Chrysosoma citra</i> , <i>Ficinia muricata</i> , <i>Nemesia fruticosa</i> , <i>Asparagus striatus</i> , <i>Cissampelos</i> , <i>Senecio radicans</i> , <i>Chrysanthemoides bicolor</i> , <i>Pteronia hircina</i> , <i>Colektion campanulata</i> , <i>Galtonia struthifolium</i>	<i>Panicum schinzii</i> (d), <i>Melinis repens</i>

Figure 5.6.2

Faunal evidence

The proposed loop expansion site at Eagle's Crag lies predominantly between agricultural lands and rocky ridges. Evidence of faunal activity within the railway reserve includes:

Taxa of Conservation Interest	Ecological Importance
<i>Aloe speciosa</i> , <i>A. ferox</i> – PP Mesembryanthemaceae (<i>Diosperma echinatum</i> , <i>Ruschia pulchella</i> , <i>R. uctinata</i> , <i>Lampranthus prostratus</i>) – PP Amaryllidaceae (<i>Bruceopsis unguis-cati</i> , <i>Nerine cf. flexuosa</i>) – PP <i>Pachypodium succulentum</i> – PP <i>Hypoxis cf. inflata</i> – Med	Medium – high species richness with many protected taxa. Adjacent to outcrop with high species richness

(d) – dominant taxa
PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
Med – Valued medicinal plant (Van Wyk *et al.*, 1997)

5.6.2 Fauna



Trapdoor Spider burrow – likely Family = Ctenizidae

During the field investigations 21 bird species were recorded at the site, including African Red-eyed Bulbul (*Pycnonotus nigricans*), Egyptian Geese (*Anoplocygnus aegyptiacus*) and Fork-tailed Drongo (*Dicrurus adsimilis*). For a complete species list refer to Appendix A. Two mammal species, Baboons (*Papio hamadryas ursinus*) and Scrub Hare (*Lepus saxatilis*), were also recorded in the vicinity of the proposed site. No Red Data species were observed on site. The construction of the loop extension at Eagle's Crag will almost certainly destroy the Trapdoor Spiders (likely Family Ctenizidae) burrowing in the substrate within the railway reserve. Although evidence of only one spider burrow is provided, generally more than one will utilize an area that is suitable for burrowing. In addition, it is likely that portions of the ridges will be disturbed during construction and although no scorpions were observed at the site the ridges are potential habitats for certain protected species (*Opiostrophus* spp.)³.

(2) National listings of CR, EN, VU and Protected Species (PS), according to Section 58(1) of the National Environmental Management: Biodiversity Act, 2004 (Act no. 10, 2004)

6. TOOTABI

5.7.1 Flora

The study site was located along the Bushman's River Valley and comprised of relictual Kowie Thicket that was partly disturbed by former agricultural activities. The Kowie Thicket elements comprised of tall woody succulents (mainly the genera *Euphorbia* and *Aloe*) and dense, spinescent shrub dominated by *Acacia natalitia* and *Plumbago auriculata*. The invasive tendency of *A. natalitia* was probably a function of past agricultural disturbances that took place in the immediate vicinity. The railway servitude was elevated along this part of the loop, causing dense proliferation of *Acacia* shrub along the side. Exotics were represented by localised groves of *Agave americana* (Invader; Category 2) and *Nicotiana glauca* (Weed; Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Plumbago auriculata</i> (d), <i>Acacia natalitia</i> (d), <i>Azania tetrandrinia</i> (d), <i>Cyananthium ellipticum</i> (d), <i>Lycium cinereum</i> , <i>Euphorbia tetragona</i> , <i>Disopygus pallens</i> , <i>Gynurasparia capitata</i> , <i>Ehretia rigida</i> , <i>Portulacaria afr.</i> , <i>Capparis septaria</i> , <i>Hippobromus panicillatus</i> , <i>Marrua cifra</i> , <i>Aloe farax</i> , <i>Cuscuta spicata</i> , <i>Cadaba aphylla</i> , <i>Aloe speciosa</i>	<i>Euphorbia maritima</i> (d), <i>Bulbine frutescens</i> (d), <i>Nemesia fruticans (d)</i> , <i>Albica serosa</i> , <i>Asparagus africanus</i> , <i>Sarcosemma viminalis</i> , <i>Crassula nitida</i> , <i>Senecio radicans</i> , <i>Cotyledon orbiculata</i> , <i>Palaemonium carinatum</i> , <i>Guzmania herbicola</i> , <i>Trachymandra cf. affinis</i>	<i>Panicum schinzii</i> (d), <i>Eragrostis citrifolia</i>
Taxa of Conservation Interest: (d) – dominant taxa	<i>Aloe trinitior</i> , <i>A. speciosa</i> – PP	
Ecological importance: Low		

PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.7.2 Fauna

The proposed site for the construction of a new loop at Tootabi was located adjacent to the Boesmans River. During the field investigations 10 bird species and three mammal species were observed, or evidence of their presence was observed. Species included Black-headed Oriole (*Oriolus larvatus*), Common Moorhen (*Gallinula chloropus*), Porcupine (*Hystrix africaeastralis*) and Grey

7. BLINKHOF

5.8.1 Flora

The study site was located on slightly undulating plains surrounded by mountain ridges that formed part of the Albany Broken Veld. Floristically, the vegetation composition recalled the transition between elements of the Albany Thicket and the dry, karroid shrub of the Nama-Karoo Biome. The vegetation could be described as low, open karroid shrub on rocky soils derived from Witteberg Group shale and arenite. The graminoid layer was sparse, consisting of short tufted grasses. However, the forb composition, although poor in richness, showed strong affinities with the Fynbos Biome (the presence of *Elytropappus rhinocerotis*). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Grewia robusta</i> , <i>Croton hispidus</i> , <i>Rhus lucida</i> , <i>Aloe farax</i> , <i>Acacia tarroo</i>	<i>Felicla filifolia</i> (d), <i>Baccharis hutchinsonii</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Asparagus africanus</i> , <i>Pentzia globosa</i> , <i>Ledebouria sp.</i> , <i>Asparagus strittus</i> , <i>Felicla nutricata</i> , <i>Asparagus capensis</i> , <i>Croton bicolor</i>	<i>Eragrostis armula</i> (d), <i>E. obtusa (d)</i> , <i>Arctostichia diffrisa</i>
Taxa of Conservation Interest: (d) – dominant taxa	None	
Ecological importance: Medium – high erosion potential due to sparse vegetation cover		

PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.8.2 Fauna

The proposed loop expansion site was located adjacent to what appeared to be a private game farm and evidence of Kudu (*Tragelaphus strepsiceros*) activity

along the railway reserve was evident. Evidence of other faunal activity included:

Figure 5.8.2 Faunal evidence



During the field investigations nine bird species and five mammal species were observed, or evidence of their presence was observed. Some of these species included Fiscal Flycatcher (*Sigelus silens*), Mocking Cliff-chat (*Myriococcyta chinamantheitris*), Common Keatrel (*Falco bimaculatus*), Grey Duker (*Sylvicapra grinnia*) and Stearboek (*Raphicerus campestris*). For a complete list of species refer to Appendix A. No Red Data species were recorded, however, possible scorpion burrows of the *Opisthophilinus* genus, all species in this genus are protected, were observed in the vicinity of the site. Although faunal activity was relatively high, particularly mammal activity, the construction of the loop extension at Blinshof is unlikely to cause any major disturbance to fauna in the area provided activities remain within the railway reserve.

5.9

8. SALTVAIRE

5.9.1 Flora

The study site was in many respects similar to Blinshof. It was located on undulating plains that formed part of the Albany Broken Veld. The vegetation could be described as low, open karroid shrub on rocky soils derived from Whiteberg Group shale and arenite. The gramnoid layer was sparse, consisting of short tufted grasses. However, forb species diversity was poor, especially in comparison to the mesic Thicket vegetation recorded further south. Exotics were represented by localised groves of *Agave americana* (Invader: Category 2) and *Pinus* sp. (Invader: Category 2). Floral site characteristics include:

Figure 5.9.2

Faunal evidence

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lygenia cineraria</i> (d), <i>Rhigozua tricholomium</i> , <i>Scleria africana</i> ssp. <i>africana</i> , <i>roburata</i> , <i>Rhus lucida</i> , <i>Poppo copensis</i> , <i>Baccharis oleoides</i> , <i>Azima terracolumbica</i> , <i>Croton bispinosus</i>	<i>Aloe striata</i> (d), <i>Asparagus striatus</i> , <i>Sansibartha aethiopicus</i> , <i>Asparagus africanus</i> , <i>Peperomia globosa</i> , <i>Alibea setosa</i> , <i>Cassida maculosa</i> , <i>Cyperoctenium cf. quinatum</i>	<i>Eragrostis curvula</i> (d), <i>Digitaria eriantha</i> (d), <i>Aristida congesta</i> , <i>Eriopogon scoparius</i>

Ecological importance:	Low
Interest:	<i>Aloe striata</i> - PP <i>Mesobletia</i> sp. & <i>Phyllanthus splendens</i> - PP
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974	

5.9.2 Fauna

The proposed loop expansion site was located adjacent to a rocky ridge. Evidence of faunal activity included:

Baboon (*Papio anubus*) droppings

Rock Hyrax (*Procapra capensis*) midden

During the field investigations 12 bird species and nine mammal species were observed, or evidence of their presence was observed. Some of these species included *Acacia Pied Barbet* (*Trichothraupis leucotis*), Eastern Long-billed Lark (*Certhilunda semitorquata*), Hadebe Ibis (*Bostrychia iugandis*), Scrub Harle (*Lepus savius*) and Porcupine (*Hystrix africaeastensis*). For a complete list of species refer to Appendix A. No Red Data species were recorded, however, possible

scorpion burrows of the *Opisthoplathinus* genus (all protected species in this genus) were observed in the vicinity of the site. Although faunal activity was relatively high, particularly mammal activity, the construction of the loop extension at Saltaire is unlikely to cause any major disturbance to fauna in the area provided activities remain within the railway reserve. If the railway reserve is required to be widened possible disturbance to the rocky ridges could result in minor habitat loss for some burrowing scorpion species (*Opisthoplathinus* spp.).

5.10

9. KOMMADAGGA

5.10.1 Flora

The study site was structurally and compositionally similar to the Saltaire area, and corresponded to undulating plains of the Albany Broken Veld. Floristically, the vegetation composition recalled the transition between elements of the Albany Thicket and the dry, karroid shrub of the Nama-Karoo Biome. The vegetation can be described as secondary karroid shrub on rocky soils derived from Witteberg Group shale and arenite. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium cinerum</i> , <i>Azima</i>	<i>Asparagus africanus</i> (c), <i>A. striatus</i>	<i>Eragrostis armata</i> (d), <i>E. obtusa</i>
<i>Leucadendron</i> , <i>Pappas copensis</i> , (d), <i>Falcatia muricata</i> (d), <i>Racina</i>	<i>Leucadendron</i> , <i>Pentzia globosa</i> , <i>Leucadendron</i> , <i>Pentzia globosa</i> , <i>Leucadendron</i> , <i>Pentzia globosa</i>	(d), <i>Melinis repens</i> , <i>Aristida congesta</i> , <i>Panicum setaceum</i> , <i>Digitaria eriantha</i> , <i>Bromus pectinatus</i>
<i>Euclea undulata</i> , <i>Acacia karroo</i> , <i>Boscia aloides</i> , <i>Scholtia affra</i> var. <i>affra</i> , <i>Crotalaria aphylla</i>	<i>Pteridium aquilinum</i> , <i>Eriosepium ericoides</i> , <i>Rhigozum trichotomum</i> , <i>Aloe striata</i> , <i>Cinerea lobata</i>	

Taxa of Conservation Interest:	<i>Ruscia</i> sp. - PP <i>Aloe striata</i> - PP
Ecological Importance:	Low

(d) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.10.2 Fauna

The proposed loop expansion site was located within an undulating landscape, which required the use of extensive borrow material to level portions of the existing track. Evidence of faunal activity included:

Figure 5.10.2 Faunal evidence



Baboon Spider (possible Family - Theraphosidae) burrows within unused borrow material on the edge of the railway reserve.

During the field investigations only four bird species and four mammal species were observed, or evidence of their presence was observed. Some of these species included African Paradise-flycatcher (*Terpsiphone viridis*), Bokmakierie (*Telephonus capensis*), Small Grey Mongoose (*Galerella pulterellii*) and Steenbok (*Raphiceros campestris*). For a complete list of species refer to Appendix A. No Red Data species were recorded, however, there were approximately 10 Baboon Spider (possible Family - Theraphosidae) burrows located within the site (all species are listed as protected). While construction is unlikely to result in any significant disturbance to the general fauna in the area the Baboon Spiders will almost certainly be destroyed during the construction of the loop extension at Kommadagga.

5.11

10. COLDEN VALLEY

5.11.1 Flora

The study site was located due south of Cookhouse and was surrounded by cultivated land. The vegetation on the site was severely perturbed, comprising mainly of pioneer taxa and annual weed species. Exotics were represented by *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:

(P) - National Listings of CC, EN, VU and Protected Species (PS), according to Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act no. 10, 2004)



Woody (Trees & shrubs)	Herbaceous (Forbs)	Gaminioid (Grass & Sedge)
<i>Solanum tomentosum</i> , <i>Euxex mestrinii</i>		<i>Eragrostis curvula</i> (d), <i>Digitaria eriantha</i>
Taxa of Conservation Interest:	None	
Ecological Importance:	Low	
(d) – dominant taxa		

5.11.2 Fauna

The proposed loop expansion site was surrounded by disturbed vegetation and cultivated fields, which was the likely factor for limited faunal activity in the area. During the field investigations only seven bird species were observed at the site, these include Cape Sparrows (*Passer melanurus*), Cape Turtle Doves (*Streptopelia capicola*) and Red-billed Quelena (*Quelena quelea*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Golden Valley is unlikely to cause any major disturbance to fauna in the area.

5.12 10.1 COOKHOUSE BORROW PIT 1

5.12.1 Flora

The study site was located to the north of Cookhouse *en route* towards the Farm Craig Gowan. The study site corresponded to an open *Acacia* woodland utilised for livestock grazing. Structurally, it was composed of a well-developed grassy layer dominated by genera such as *Arctostida* and *Eragrostis* interspersed by an open *Acacia karroo* woodland. Floral site characteristics include:



Woody (Trees & shrubs) **Herbaceous (forbs)** **Gaminioid (Grass & Sedge)**

Acacia karroo (d), <i>Aloe ferox</i>	<i>Falcatia muricata</i> (d), <i>Peritiza globosa</i> , <i>Cynanthus swinhoei</i> , <i>Asparagus strabus</i> , <i>Bulbine abyssinica</i>	<i>Eragrostis racemosa</i> (d), <i>Arctostida congesta</i>
Taxa of Conservation Interest:	<i>Cynanthus swinhoei</i> – PP, NT (Victor & Dold, 2003)	
Ecological Importance:	Medium – high density of a protected geophyte and the site is located in a threatened habitat – Fish Speckboom Thicket.	
(d) – dominant taxa		
PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974		
NT – Near-threatened (according to IUCN listing criteria)		

5.12.2 Fauna

The proposed borrow pit north of Cookhouse is an existing borrow pit and the veld around the old borrow pit is used for grazing of livestock. Faunal activity at the site was limited. During the field investigations eight bird species and five mammal species were observed, or evidence of their presence was observed. Species included Black-shoulder Kite (*Elanus caeruleus*), Common Fiscal (*Lanius collaris*), Jackal Buzzard (*Buteo nigrifrons*), Scrub Hare (*Lepus saxatilis*) and Grey Dukker (*Sylvicapra grimmia*). For a complete list of species refer to Appendix A. No Red Data species were recorded, however a likely Baboon Spider (possible Family - Theraphosidae) burrow was located on site (all species are considered protected). While the use of this borrow pit is unlikely to cause significant disturbance to the general fauna in the area the Baboon Spider is likely to be destroyed, and although only one burrow was located there are probably more within the immediate vicinity.

5.13 10.2 COOKHOUSE BORROW PIT 2

5.13.1 Flora

The study site was located east of Cookhouse along the N10 highway. It corresponded to an open grassy plain that was utilised for livestock grazing. Structurally, the vegetation was composed of a well-developed grassy layer dominated by genera such as *Digitaria* and *Themeda*, while the forb and woody layer was almost absent (comprising of scattered *Acacia* shrub). The absence of a well-defined woody element could be explained through past bush-clearing activities to enhance the grazing capacity of the area. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karroo</i> , <i>Albizia</i>	<i>Felicla imbricata</i> (d), <i>Aspangus striatus</i>	<i>Eragrostis lehmanniana</i> (d), <i>E. obtusa</i>
Taxa of Conservation interest:	<i>Cyrtanthus smithii</i> - PP, NT (Victor & Dold, 2003) <i>Albizia</i> - PP	
Ecological importance:	<i>Stapelia grandiflora</i> var. <i>grandiflora</i> - PP	
(d) - dominant taxa	Medium - presence of protected plant taxa and the site is located in a threatened habitat - Fish Speekboom Thicket	

PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
NT - Near-threatened (according to IUCN listing criteria)

5.13.2 Fauna

The proposed borrow pit is an existing pit and the veld surrounding it has been used for grazing livestock. Faunal activity at the site was limited. During the field investigations eight bird species and three mammal species were observed, or evidence of their presence was observed. Some of these species included Cape Longclaw (*Macropygia capensis*), Cattle Egret (*Bubulcus ibis*), Steenbok (*Raphicercus campestris*) and Scrub Hare (*Lepus saxatilis*). For a complete list of species refer to Appendix A. No Red Data species were recorded, however a likely Baboon Spider (possible Family - Theraphosidae) burrow was located on site (all species are considered protected). While the use of this borrow pit is unlikely to cause significant disturbance to the general fauna in the area the Baboon Spider is likely to be destroyed, and although only one burrow was located there are probably more within the immediate vicinity.

5.14

10.3 GOLDEN VALLEY BORROW PIT

5.14.1 Flora

The study site was structurally and compositionally similar to the Saliare area and corresponded to Albany Broken Veld consisting of a well-developed graminoid layer. Floristically, the vegetation composition recalled the transition between elements of the Albany Thicket and dry, karroid shrub of the Nama-Karoo Biome. The area was utilised for livestock grazing. Access to this proposed borrow pit was restricted and could subsequently not be assessed in detail. Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karroo</i> , <i>Lycium citreum</i>	<i>Felicla imbricata</i> , <i>Hemimelia cuneifolia</i>	<i>Eragrostis lehmanniana</i> , <i>E. obtusa</i> , <i>Digitaria erinanthus</i>
Taxa of Conservation interest:	None - possible occurrence of <i>Cyrtanthus smithii</i> - PP, NT (Victor & Dold, 2003)	
Ecological importance:	Medium	

(d) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
NT - Near-threatened (according to IUCN listing criteria)

5.14.2 Fauna

Access to the proposed borrow pit, which was an existing borrow pit, was restricted because it was located on an Ostrich farm, which had biosecurity measures in place. The existing borrow pit could be viewed from the road (N10) and in the general area faunal activity was limited. Only four bird species were observed in the vicinity of the borrow pit, these included Cape Turtle Doves (*Streptopelia capicola*), Hadeda Ibis (*Bostrychia ingedashi*), Egyptian Geese (*Alopochen aegyptiaca*) and Red-billed Quelea (*Quelea quelea*). Although the site was not assessed in detail it is unlikely that there will be any significant disturbance to fauna within the general area if the existing borrow pit is utilized.

5.15

11. KLIPFONTEIN

5.15.1 Flora

The study site coincided with the Groot Fish River Valley and was surrounded by agricultural land. The vegetation comprised of dense secondary grassland that was probably artificially cultivated along the railway cuttings to counteract possible erosion. However, the remainder of the composition comprised of a woody layer dominated by taxa pertaining to the genera *Acacia* and *Lycium*. The forb layer was well-developed and comprised of many succulent genera such as *Allox* and *Cotyledon*. Exotics were represented by *Agave americana* (Invader: Category 2), *Pinus* sp. (Invader: Category 2) and *Opuntia imbricata* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
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<i>Aloe vera</i> , <i>Rhus burckellii</i> , <i>Acacia karroo</i> , <i>Grewia robusta</i>	<i>Euphorbia maritima</i> (d), <i>Felicia muricata</i> (d), <i>Asparagus striatus</i> , <i>A. setulosus</i> , <i>Peltargonium comosum</i> , <i>Pentzia globosa</i> , <i>Sarcocolla aethiopica</i> , <i>Aloe laurior</i> , <i>A. striata</i> , <i>Cobboldia campuloides</i>	<i>Eriopogon scoparius</i> (d), <i>Aristida congesta</i> , <i>Panicum sibirici</i>
Taxa of Conservation Interest:	<i>Aloe laurior</i> , <i>A. striata</i> - PP	
Ecological importance:	Low	
(d) – dominant taxa PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974		

5.15.2 Fauna

The proposed site for the new loop was surrounded by disturbed vegetation and cultivated fields, which was the likely factor for limited faunal activity in the area. During the field investigations only 10 bird species were observed at the site, these include African Hoopoe (*Upupa africana*), Black-headed Heron (*Ardea melanocephala*) and Booted Eagle (*Aquila pennata*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the new loop at Klipfontein is unlikely to cause any major disturbance to fauna in the area.

5.16

11.1 KLIPFONTEIN CUTTING AS BORROW PIT

5.16.1 Flora

The study site coincided with the Groot Fish River Valley and was surrounded by agricultural land. The structure and composition of the vegetation was similar to the Klipfontein area.

5.16.2 Fauna

The borrow material was located in close proximity to the proposed loop expansion site at Klipfontein. Faunal activity at the site was limited. During the field investigations 13 bird species were observed, these included Cape Glossy Starling (*Lamprolaima nitens*), Common Fiscal (*Lanius collaris*) and Namaqua Dove (*Oena capensis*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The use of the borrow material is unlikely to cause significant disturbance to fauna in the area.

5.17

12. MORTIMER

5.17.1 Flora

The study site coincided with the Groot Fish River Valley and was surrounded by agricultural land. The area was previously disturbed, probably during the installation of the existing railway line, and consisted of a dry, open karroid shrub dominated by secondary grass species. The woody layer

was poorly defined and lacked in species richness, while the forb layer comprised of many pioneer taxa that were of little economic or conservation value. However, a drainage line was present along the railway and dominated by the mega-graminoid *Phragmites australis*. Exotics were represented by *Argemone ochroleuca* (Weed: Category 1), *Argemone mexicana* (Invasive: Category 2), *Prosopis glandulosa* (Invasive: Category 2) and *Schinus molle* (proposed Invasive). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium attenuatum</i> (d), <i>Rhus lancea</i> , <i>Gyniostegia buxifolia</i> , <i>Diapsalis lycoides</i>	<i>Cirsiumtheophrasti</i> <i>inocua</i> (d), <i>Asparagus aethiopicus</i> , <i>Typha capensis</i> , <i>Rumex crispus</i> , <i>Neousia fruticosa</i> , <i>Bulbine frutescens</i> , <i>Tringopogon albus</i> , <i>Atriplex semibaccata</i>	<i>Panicum schinzii</i> (d), <i>P. maximum</i> (d), <i>Digitaria eriantha</i> , <i>Eriopogon scoparius</i> , <i>Eragrostis curvula</i> , <i>Sporobolus fimbriatus</i> , <i>Setaria verticillata</i> , <i>Phragmites australis</i>

Taxa of Conservation Interest:	None
Ecological importance:	Medium – presence of a wetland-associated plant composition (d) – dominant taxa

5.17.2 Fauna

The proposed loop expansion site was surrounded by cultivated fields, which was the likely factor for limited faunal activity in the area. During the field investigations only seven bird species and four mammal species were observed at the site, these include Southern Red Bishop (*Euplectes orix*), Southern Bourbon (*Laniarius nallanthi*), Vervet Monkeys (*Cercopithecus aethiops*) and Yellow Mongoose (*Cynictes penicillatus*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Mortimer is unlikely to cause any major disturbance to fauna in the area.

5.18

13. HALSOWEN

5.18.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of prominent, open grassy plains dominated by the mid-successional graminoid *Eragrostis lehmanniana*. The composition consisted of a forb layer that was dominated by dwarf, decumbent succulents and microphyllous shrubs, and a sparse, thorny woody layer composed of *Acacia* and *Lycium*. The vegetation

corresponds with the Eastern Upper Karoo floristic region, although many of the taxa were secondary and indicative of past disturbances. Exotics were represented by *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karoo</i> , <i>Lycium cinerum</i> , <i>Lycium aegyptium</i>	<i>Pentzia incana</i> (d), <i>Eragrostis ericoides</i> , <i>Pentzia globosa</i> , <i>Nemesia fruticans</i> , <i>Atriplex semibaccata</i>	<i>Eragrostis lehmanniana</i> (d), <i>E. bicolor</i> , <i>Aristida congesta</i>

Taxa of Conservation interest: Mesembryanthemaceae (*Drosanthemum hispidum*, *Phyllobolus splendens*, *Psilocaulon coriarium*, *P. articulatum*, *Molophora* sp.) - PP

Ecological importance: Low

(d) - dominant taxa

PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.18.2 Fauna

The proposed loop expansion site was surrounded mostly by disturbed vegetation. In general the faunal activity in the area was low, an example reptile activity included:

Figure 5.18.2



Parrot-beaked Padloper (*Homopus areolaris*)

During the field investigations only three bird species and one mammal species were observed at the site, these include Hadedda Ibis (*Bostrychia hagedashii*), Lesser Grey Shrike (*Lanius minor*), Neddicky (*Cisticola fulvicapillus*) and South African Ground Squirrel (*Xerus inarris*). No Red Data species were

5.19

recorded on site. The construction of the loop extension at Halesowen is unlikely to cause any major disturbance to fauna in the area.

14. MARLOW

5.19.1 Flora

The study site was impacted by severe anthropogenic activities and intensive agricultural practices. The transformed state of the environment was mirrored by a floristic composition comprising of ruderal weeds and redundant taxa not considered to be of any conservation value. Exotics were represented by *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium cinerum</i> , <i>Acacia karoo</i>	<i>Plantago lanceolata</i> , <i>Nemesia fruticans</i> , <i>Forsskolea caudata</i> , <i>Rumex crispus</i> , <i>Psilocaulon articulatum</i>	<i>Cynodon dactylon</i> (d), <i>Bromus pectinatus</i> (d)

Taxa of Conservation interest: *Psilocaulon articulatum* - PP

Ecological importance: Low

(d) - dominant taxa

PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.19.2 Fauna

The proposed loop expansion site was surrounded by anthropogenic disturbances (farming community), which was the likely factor for limited faunal activity in the area. During the field investigations only 10 bird species were observed at the site, these include Acacia Pied Barbet (*Tricholaima leucotis*), African Hoopoe (*Upupa africana*) and Common Fiscal (*Lanius collaris*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Marlow is unlikely to cause any major disturbance to fauna in the area.

14.1 MARLOW BORROW PIT

5.20.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of gentle, sloping plains dominated by mid-successional grassland taxa of the genera *Aristida* and *Eriopogon*. A diverse assemblage of dwarf, microphyllous shrubs and thorny taxa of the genera *Acacia*, *Grewia*, *Gymnosporia* and *Rhus* dominated the woody composition. However, the occurrence of an arenite-derived ridge and stone-littered slopes has elevated the species richness tremendously in comparison to the previously discussed sites. The vegetation comprehends the Eastern Upper Karoo floristic region and intergrades with Tarkastad Montane Shrubland, thereby increasing the potential plant diversity likely to be present. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karroo</i> , <i>Grewia robusta</i> , <i>Rhus burdettii</i> , <i>Gymnosporia huxleyana</i> , <i>Disopyrus dichrophylla</i>	<i>Becton burdettianum</i> (f), <i>Eriosephus ericoides</i> (f), <i>Felicia rigidula</i> , <i>Euphorbia amplexicaulis</i> , <i>Asplenium cordatum</i> , <i>Aptoshium procumbens</i> , <i>Sausuretea aethiopsica</i>	<i>Aristida diffusa</i> (f), <i>Eriopogon scoparius</i> , <i>Tragus koderoides</i>
Taxa of Conservation interest:	<i>Amaryllidaceae</i> (<i>Hemeranthus humilis</i> , <i>Cynthis contractus</i>) - PP	<i>Hemorrhoidalis</i> <i>bracteata</i> - PP
Ecological importance:	<i>Trichodanum portulacinae</i> & <i>Ruscus spinosus</i> - PP	High - high species richness and the occurrence of many protected taxa

(f) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.20.2 Fauna

The proposed borrow pit north of Cradock is an existing borrow pit at the base of a rocky ridge. Faunal activity at the site was relatively high. During the field investigations 18 bird species and six mammal species were observed, or evidence of their presence was observed, in the vicinity of the borrow pit. Species included African Fish Eagle (*Haliaeetus vocifer*), Brown-hooded Kingfisher (*Halcyon albiventris*), Kahlari Scrub Robin (*Erythropygia picta*), Aardvark (*Orycteropus afer*) and South African Ground Squirrel (*Xerus inanis*). For a complete list of species refer to Appendix A. Although not on site, Blue Cranes (*Anthropoides paradiseus*), which are listed as a vulnerable species, were

5.21

15. KAPTEIN

5.21.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of flat plains dominated by mid-successional grassland taxa pertaining to the genus *Eriopogon*. The area showed signs of past disturbance events (as evidenced by the occurrence of *Tagetes minima* and *Argemone ochroleuca*) and was subsequently poor in floristic richness. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karroo</i> , <i>Elyonon citrinum</i>	<i>Feldia muricata</i> (f), <i>Emex australis</i> , <i>Atriplex semibaccata</i> , <i>Sesuvium triphyllum</i> , <i>Psilocaulon corinthium</i>	<i>Eriopogon scoparius</i> (f)
Taxa of Conservation interest:	<i>Psilocaulon corinthium</i> - PP	<i>Drosanthemum hispidum</i> - PP
Ecological importance:	Low	

(f) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.21.2 Fauna

The proposed loop expansion site was surrounded by disturbed vegetation, which was the likely factor for limited faunal activity in the area. During the field investigations only five bird species and four mammal species were observed, or evidence of their presence was observed, these include Anteating Chat (*Myiacoecilia formicivora*), Cape Longclaw (*Macropygia capensis*), Aardvark (*Orycteropus afer*) and Yellow Mongoose (*Cynictis penicillata*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Kaptein is unlikely to cause any major disturbance to fauna in the area.

5.22

16. KNUTSFORD

5.22.1 Flora

The study site showed signs of past disturbances to the extent that any phytosociological study was deemed unnecessary.

5.22.2 Fauna

The proposed loop expansion site was surrounded by disturbed vegetation, which was the likely factor for limited faunal activity in the area. During the field investigations only eight bird species and one mammal species were observed, or evidence of their presence was observed, these include Black-shouldered Kite (*Mitris cinerilis*), Eastern Clapper Lark (*Mimifra fasciolata*) and Small grey Mongoose (*Galerella pulverulenta*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Knutsford is unlikely to cause any major disturbance to fauna in the area.

5.23

16.1 KNUTSFORD BORROW PIT

5.23.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of gentle, sloping plains dominated by many mid- to late-successional graminoid taxa of the genera *Aristida*, *Eragrostis*, *Eriosegona*, *Themeda* and *Cymbopogon*. A diverse assemblage of dwarf, microphyllous shrubs and spinescent woody taxa of the genera *Acacia*, *Grewia* and *Carrisa* dominated the plant composition. However, the occurrence of a shale-derived ridge and stone-littered slopes has elevated the species richness tremendously in comparison to the surrounding landscape. The composition comprehends the Eastern Upper Karoo floristic region and intergrades with Tarkastad Montane Shrubland, thereby increasing the potential plant diversity likely to be present. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karoo</i> , <i>Dasypros lydaleae</i> , <i>Grewia robusta</i> , <i>Carrisa bispinosa</i>	<i>Eriosegona ericoides</i> (d), <i>Ruschia spinosa</i> , <i>Feltia muricata</i> , <i>Asparagus strigosus</i> , <i>Roseria humilis</i> , <i>Roseria glomerata</i>	<i>Eragrostis bergina</i> (d), <i>Aristida diffusa</i> (d), <i>Cymbopogon pospischilii</i> , <i>Eucalyptus scoparius</i> , <i>Themeda triandra</i>

Taxa of Conservation Interest:

Mesembryanthemaceae (*Ruschia spinosa*, *Delosperma multiflorum*, *Drosanthemum hispidum*, *Nidopora* sp., *Ruschia eriockensis* subsp. *cradockensis*, *Trichodina* sp.) – PP
Plectropanthium succulentum – PP

Ecological importance:

(d) – dominant taxa
 PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.23.2 Fauna

The proposed borrow pit is an existing borrow pit at the base of a rocky ridge. Faunal activity at the site was relatively high even though there were only eight bird species and six mammal species identified during the field investigations. Species included Karoo Korhaan (*Eupodotis vigorsii*), Wattled Starling (*Centropus viridis*), Aardvark (*Orycteropus afer*) and Steenbok (*Raphicerus campestris*). For a complete list of species refer to Appendix A. Although no Red Data species were recorded and there were only a limited number of birds and mammals observed, or evidence of their presence observed, there would still be a significant disturbance to fauna in the area if the borrow pit was utilized, as the species richness particularly on the ridge above the borrow pit was high.

5.24

16.2 KNUTSFORD BORROW MATERIAL

5.24.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of gentle, undulating plains dominated by graminoid taxa pertaining to the genera *Aristida* and *Eragrostis*. However, the structure of the vegetation comprised of an open graminoid layer with scattered tall *Acacia* shrub. The soils were rocky and shale-derived. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karoo</i>	<i>Feltia muricata</i> (d), <i>Ruschia spinosa</i> , <i>Eriosegona ericoides</i> , <i>Themeda linearis</i>	<i>Eragrostis bergina</i> (d), <i>Aristida diffusa</i> (d), <i>Heteropogon contortus</i>

Taxa of Conservation Interest:	Ecological importance:
<i>Ruschia spinosa</i> – PP <i>Boophaea disticha</i> – Med	Low

(d) – dominant taxa

PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974
Med - Valued medicinal plant (Van Wyk *et al.*, 1997)

5.24.2 Fauna

The proposed borrow pit was located in a rocky veld adjacent to the railway reserve, with an irrigation channel in close proximity. Faunal activity at the site was low. During the field investigations seven bird species and four mammal species were observed, or evidence of the presence was observed. Species included Black-shouldered Kite (*Milvus castralis*), Cape Wagtail (*Motacilla capensis*), Aardvark (*Oryzopsis afer*) and Water Mongoose (*Atilax philidensis*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The use of borrow material from the site is unlikely to cause any major disturbance to fauna in the area.

5.25

17. VISRIVIER

5.25.1 Flora

The study site showed signs of past disturbance regimes to the extent that any phytosociological study was deemed unnecessary. The floristic composition comprised of many secondary grass taxa and ruderal forb species. Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (Forbs)	Graminoid (Grass & Sedge)
<i>Acacia karroo</i>	<i>Galenia strictiflora</i> , <i>Salsola kati</i>	<i>Eragrostis curvula</i> (d), <i>E. obtusa</i> (d), <i>Aristida adscensionis</i> , <i>Eumopogon scoparius</i>
Taxa of Conservation Interest:	<i>Panicum cf. curvatum</i> - PP	
Ecological Importance:	Low	

(d) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.25.2 Fauna

The proposed loop expansion site was surrounded by disturbed vegetation, which was the likely factor for limited faunal activity in the area. During the field investigations only eight bird species and three mammal species were observed, or evidence of the presence was observed. Some of the species included African Hoopoe (*Upupa africana*), Cattle Egret (*Bubulcus ibis*), Aardvark (*Oryzopsis afer*) and Steenbok (*Raphiceros campestris*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Visrivier is unlikely to cause any major disturbance to fauna in the area.

5.26

17.1 VISRIVIER: COLLETT SE QUARRY

5.26.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of flat, stony plains dominated by many mid-successional graminoid taxa of the genera *Aristida* and *Eragrostis*. The forb layer was poorly defined consisting of many dwarf, microphyllous shrubs dominated by members of the Asteraceae. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (Forbs)	Graminoid (Grass & Sedge)
	<i>Falcatia mucroloba</i> (d), <i>Eriocaulis ericoides</i> , <i>Thesium lituatum</i> , <i>Ruscus spinosus</i> - PP	<i>Aristida adscensionis</i> (d), <i>Eragrostis lehmanniana</i>
Taxa of Conservation Interest:	<i>Ruscus spinosus</i> - PP	
Ecological Importance:	Low	

(d) - dominant taxa
PP - Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.26.2 Fauna

The borrow pit was located in a flat rocky landscape. Faunal activity at the site was limited. During the field investigations seven bird species and three mammal species were observed, or evidence of their presence was observed. Species included African Stonechat (*Saricola torquata*), Ant-eating Chat (*Myrmecocichla formicivora*), Eastern Clapper Lark (*Mirafra fasciata*) and Aardvark (*Oryzopsis afer*). For a complete list of species refer to Appendix A. No Red Data species were recorded on site. The use of the borrow material at the Visrivier quarry is unlikely to cause significant disturbance to fauna in the area.

5.27

17.2 VISRIVIER POSSIBLE BORROW PIT

5.27.1 Flora

The study site comprised of a denuded borrow pit that was subsequently invaded by *Eucalyptus camaldulensis* and *Acacia karroo* shrub. Exotics were represented by localised groves of *Eucalyptus camaldulensis* (Invader Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia karoo</i> (d), <i>Encalyptus cumalattensis</i> (d)	<i>Aplosimum procumbens</i>	<i>Enneapogon scoparius</i> , <i>Erioglossis curvata</i>
Taxa of Conservation interest:	None	
Ecological importance:	Low	
(d) – dominant taxa		

5.27.2 Fauna

The proposed borrow pit, which was an existing pit, was located approximately 100m south of the Great Fish River. Due to disturbances such as dwellings in the vicinity, poor vegetation cover and exotic vegetation faunal activity in the area was very low. During the field investigations only four bird species were observed on site. These species included African Hoopoe (*Upupa africana*), Barn Swallow (*Hirundo rustica*), Cape Sparrow (*Passer melanurus*) and Common Fiscal (*Lanius collaris*). The use of the borrow material at the Visrivier quarry is unlikely to cause significant disturbance to fauna in the area.

5.28

18. CONWAY

5.28.1 Flora

The study site showed signs of past disturbance regimes to the extent that any phytosociological study was deemed unnecessary. The floristic composition comprised of secondary grass species, particularly stoloniferous taxa and ruderal forb species. Exotics were represented by localised groves of tall *Pinus* spp. (Invader: Category 2). Floral site characteristics include:



NATURAL SCIENTIFIC SERVICES

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chierum</i>	<i>Felicia muricata</i> (d), <i>Salsola kali</i> , <i>Asparagus neliopicatus</i>	<i>Sporobolus fibrillatus</i> , <i>Erioglossis lehmanniana</i>
Taxa of Conservation interest:	None	
Ecological importance:	Low	
(d) – dominant taxa		

5.28.2 Fauna

The proposed loop expansion site was surrounded by disturbed vegetation, which was the likely factor for limited faunal activity in the area. During the field investigations only three bird species were observed at the site, these include African Red-eyed Bulbul (*Pycnonotus nigricans*), African Stonechat (*Saxicola torquata*) and Pied Crow (*Corvus albus*). The construction of the loop extension at Conway is unlikely to cause any major disturbance to fauna in the area.

18.1 CONWAY POSSIBLE BORROW PIT

5.29.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of flat to slightly undulating plains dominated by mid-successional graminoid taxa of the genera *Aristida* and *Erioglossis*. The floristic composition consisted of a diverse assemblage of dwarf, microphyllous shrubs and included succulent taxa of the genera *Aloe* and *Ruschia*. However, a dolerite outcrop (Karoo Hardeveld) bordered the study area, thereby increasing the potential floristic species richness for the area. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chierum</i> , <i>Rhus erosa</i>	<i>Asplenium cordatum</i> (d), <i>Eriocaulis ericoides</i> (d), <i>Ruschia spruisii</i> , <i>Aloe broomii</i> , <i>Trostium lineatum</i>	<i>Digitaria angustifolia</i> (d), <i>Aristida diffusa</i> (d), <i>Erioglossis lehmanniana</i> (d), <i>E. bergiana</i>
Taxa of Conservation interest:	<i>Ruschia spinosa</i> – PP <i>Aloe broomii</i> – PP <i>Sonchitum (?)</i> sp. – PP	
Ecological importance:	High – high species richness and spatial heterogeneity	
(d) – dominant taxa		

PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

NATURAL SCIENTIFIC SERVICES

5.29.2 Fauna

The proposed borrow pit was located in karoo veld between the existing railway line and a dolerite outcrop. There was no existing disturbance, i.e. existing borrow pit, other than livestock grazing. Evidence of faunal activity included:

Figure 5.29.2 Faunal evidence



During the field investigations five bird species, six mammal species and two scorpion species were observe, or evidence of their presence was observed. Species included African Red-eyed Bulbul (*Pycnonotus nigricans*), African Stonechat (*Saxicola torquata*), Mountain Reedbuck (*Rudina fibrorifida*) and Steenbok (*Raphiceros ampestris*). For a complete species list refer to Appendix A. Although no Red Data species were recorded and species abundance was relatively low, there was relatively high species activity. The dolerite outcrop provided a suitable habitat for protected scorpion species (*Opisthoplathinus spp.*). The use of borrow material from the proposed Conway borrow pit will have significant affect on fauna on site and in the immediate vicinity.

5.30

19. GLENHEATH

5.30.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open, flat plains dominated by a diverse basal cover of mid-successional graminoid taxa pertaining to the genera *Aristida*, *Eragrostis*, *Digitaria* and *Hyparrhenia*. The floristic composition consisted of dwarf, microphyllous forbs and scattered spinescent shrub. Although of poor species richness, the composition provides a fine example of near-pristine Eastern Upper Karoo veld. Floral site characteristics include:

5.31

20. TAFELBERG

5.31.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open, flat plains dominated by a diverse basal cover of mid-successional graminoid taxa. The floristic composition consisted of dwarf, microphyllous forbs and scattered spinescent shrub, which was very similar to the composition found at Glenheath. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium cherson</i> (d), <i>Rhus burdellii</i>	<i>Ficula muricata</i> , <i>Salsola callina</i> , <i>Salsola kali</i> , <i>Eriochloa ericoides</i> , <i>Gomphocarpus fruticosus</i> , <i>Delosperum sp.</i> , <i>Rosmaria humilis</i> , <i>Panicum tuana</i>	<i>Eragrostis lanuginosa</i> (d), <i>Fingerhuthia africana</i> , <i>Digitaria eriantha</i> , <i>Eragrostis obtusa</i> , <i>Aristida adensisensis</i> , <i>Hyparrhenia hirta</i> , <i>Eurogogon scoparius</i>
Taxa of Conservation Interest:	<i>Delosperum sp.</i> - PP	
Ecological Importance:	Low	

(d) – dominant taxa
 PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.30.2 Fauna

The proposed site for the new loop was located on open flat karoo veld. Faunal activity in the area was low. During the field investigations only three bird species and three mammal species were observed, or evidence of their presence was observed. These species included African Stonechat (*Saxicola torquata*), Cape Turtle Dove (*Streptopelia capicola*), Pied Crow (*Corvus albus*), Aardvark (*Orycteropus afer*), Baboons (*Papio anubus*) in the adjacent hills, and Steenbok (*Raphiceros ampestris*). The construction of the new loop at Glenheath is unlikely to cause any major disturbance to fauna in the area.



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chieram</i>	<i>Eriocarpus ericoides</i> (d), <i>Pentzia globosa</i> , <i>Helichrysum zapheri</i> , <i>Ruschia spinosa</i> , <i>Aptesisium procumbens</i>	<i>Fingerhuthia africana</i> (d), <i>Engrostis lehmanniana</i> , <i>Aristida adscensionis</i> , <i>Ennepegon scaperris</i>
Taxa of Conservation interest:	<i>Ruschia spinosa</i> - PP	
Ecological importance:	Low	

(d) – dominant taxa
 PP – Protected plant as promulgated by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance, No. 19 of 1974

5.31.2 Fauna

The proposed loop expansion site was located on flat open karoo veld. Faunal activity in the area was low. During the field investigations only two bird species and two mammal species were observed, or evidence of their presence was observed. These species included Cape Turtle Dove (*Streptopelia capicola*), Lanner Falcon (*Falco biarmicus*), Aardvark (*Orycteropus afer*) and Steenbok (*Raphicercus campestris*). The Lanner Falcon, which is a Red Data species (Near Threatened), was observed foraging in the general vicinity of the study area. The construction of the loop extension at Tafelberg is unlikely to cause any major disturbance to fauna in the area.

5.32

21. ROSMEAD

5.32.1 Flora

The study site showed signs of frequent anthropogenic disturbances to the extent that a phytosociological study was deemed unnecessary. The floristic composition comprised mainly of secondary grass taxa and ruderal forb species. Exotics were represented by localised groves of tall *Pinus* spp. and *Encalyptus camaldulensis* (Invader: Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Encalyptus camaldulensis</i> (d), <i>Pinus spp.</i>	<i>Felicia muricata</i> (d)	<i>Engrostis lehmanniana</i> (d)
Taxa of Conservation interest:	None	
Ecological importance:	Low	

5.32.2 Fauna

The proposed loop expansion at Rosemead was located in an already disturbed site. Faunal activity was low. The construction of the loop extension is unlikely to cause any major disturbance to fauna in the area.

5.33

22. FLONKER

5.33.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of grassy slopes dominated by a basal cover of mid-successional graminoid taxa of the genera *Aristida*, *Engrostis* and *Hyparrhenia*. The floristic composition comprised of dwarf, microphyllous forbs and scattered spinescent shrub reminiscent of past disturbance regimes. Please note that the study site was bordered by “climax” Tarkastad Montane Shrubland (a ridge), which was rich in floristic elements. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chieram</i>	<i>Eriocarpus ericoides</i> (d), <i>Felicia filifolia</i> , <i>Pentzia incana</i>	<i>Engrostis arvalet</i> (d), <i>E. lehmanniana</i> , <i>Themeda triandra</i> , <i>Aristida adscensionis</i> , <i>Hyparrhenia hirta</i> , <i>Digitaria</i>

*eriantha, Cymbopogon
pospischii*

Taxa of Conservation Interest:	None
Ecological Importance:	Medium due to close proximity to "climax" Tarkasid Montane Shrubland

(d) – dominant taxa

5.33.2 Fauna

The proposed loop expansion site was located in open karoo veld adjacent to a ridge system. Faunal activity in the area was low. During the field investigations only four bird species and two mammal species were observed, or evidence of their presence was observed. These species included African Pied Starling (*Spreo bicolor*), Cape Wagtail (*Motacilla capensis*), Eastern Clapper Lark (*Mirafra fasciolata*), Pied Crow (*Corvus albus*), Aardvark (*Orycteropus afer*) and Scrub Hare (*Lepus saxatilis*). The construction of the loop extension at Flonker is unlikely to cause any major disturbance to fauna in the area.

23. CARLTON

5.34

5.34.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of grassy slopes dominated by a basal cover of mid-successional graminoid taxa of the genera *Arrhida*, *Eragrostis* and *Hyparrhenia*. The floristic composition comprised of dwarf, microphyllous forbs and scattered spinescent shrub reflecting past disturbance regimes. Please note that the study site was located in close proximity to "climax" Besenkarere Koppies Shrubland (a ridge), which was rich in floristic elements. Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invasive: Category 2). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chersonium</i> , <i>Rhus erosa</i> , <i>R. burkei</i>	<i>Eriochloa ericoides</i> (d), <i>Felicia nutriscata</i> , <i>Camphorosma purticosus</i> , <i>Sudburkia microphylla</i> , <i>Felicia filifolia</i> , <i>Nemastylis frutescens</i> , <i>Pentzia hirsuta</i> , <i>Elytropis rhinoceros</i>	<i>Eragrostis curvula</i> (d), <i>E. leptostachya</i> , <i>Themeda triandra</i> , <i>Arrhida adsonensis</i> , <i>Hyparrhenia hirta</i>
Taxa of Conservation Interest:	None	None

Medium due to close proximity to "climax" Besenkarere Koppies Shrubland

Taxa of Conservation Interest:	None
Ecological Importance:	Medium due to close proximity to "climax" Tarkasid Montane Shrubland

(d) – dominant taxa

5.34.2 Fauna

The proposed loop expansion site was located in open eroded karoo veld adjacent to a ridge system. Faunal activity in the area was low. During the field investigations only five bird species and one mammal species were observed, or evidence of their presence was observed. These species included African Pied Starling (*Spreo bicolor*), Cape wagtail (*Motacilla capensis*), Eastern Clapper Lark (*Mirafra fasciolata*), Pied Crow (*Corvus albus*), Rufous-eared Warbler (*Malcorus pectoralis*) and Baboons (*Papio hamadryas hirsutus*) (The Baboons were on the ridge adjacent to the site). The construction of the loop extension at Carlton is unlikely to cause any major disturbance to fauna in the area.

24. BARREDEEL

5.35

5.35.1 Flora

The study site showed signs of frequent anthropogenic disturbance regimes to the extent that a phytosociological study was deemed unnecessary. The floristic composition comprised mainly of secondary grass taxa and ruderal forb species. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium chersonium</i>	<i>Eriochloa ericoides</i> (d), <i>Pentzia hirsuta</i> (d), <i>Felicia nutriscata</i> , <i>Tygetis minutiflora</i> , <i>Guzunia krebsiana</i> , <i>Arctostylis</i> sp.	<i>Eragrostis lehmanniana</i> (d), <i>E. curvula</i> , <i>Chloris virgata</i> , <i>Elythrum edlycha</i>
Taxa of Conservation Interest:	None	None
Ecological Importance:	Low	

(d) – dominant taxa

5.35.2 Fauna

The proposed loop expansion site was located in open disturbed karoo veld. Faunal activity in the area was low. During the field investigations only 10 bird species and one mammal species were observed on site. Species included

5.37.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open grassy plains dominated by a basal cover of secondary graminoid taxa pertaining to the genera *Sporobolus*, *Aristida* and *Eragrostis*. The floristic composition comprised of dwarf, microphyllous forbs. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
	<i>Rosenia humilis</i> (f), <i>Eriocapellatus spinescens</i> (f), <i>Pentzia incana</i> , <i>Rosmaria glomerata</i>	<i>Sporobolus ludwigi</i> (f), <i>Aristida nelsonensis</i> , <i>Eragrostis ichnangamini</i> , <i>Stipagrostis obtusa</i>
Taxa of Conservation Interest:	None	
Ecological importance:	Low	
(f) – dominant taxa		

5.37.2 Fauna

The proposed borrow pit, which was an existing pit, was located closest to Wildfontein loop extension site in comparison to the second proposed borrow pit in the area. Faunal activity on site, particularly mammal activity, was high. During the field investigations nine bird species and five mammal species were observed, or evidence of their presence was observed. Species included Anteatting Chat (*Myrmecocichla formicivora*), Eastern Clapper Lark (*Mirafra fasciolata*), Kalahari Scrub Robin (*Erythrropygia penna*), Porcupine (*Hystrix africaeaustralis*) and Aardvark (*Oryzctopus afer*). Blue Cranes (*Anthiropoides paradiseus*), which are listed as Vulnerable species, were observed foraging in close proximity to the study area, as shown below:

African Stonechat (*Saxicola torquata*), Anteatting Chat (*Myrmecocichla formicivora*), Grey-backed Sparrowlark (*Eremopterix verticalis*) and South African Ground Squirrel (*Xerus lunaris*). For a complete species list refer to Appendix A. No Red Data species were recorded on site. The construction of the loop extension at Barredeel is unlikely to cause any major disturbance to fauna in the area.

5.36.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open secondary grassland dominated by mid-successional taxa of the genera *Eragrostis*. The forb composition was poor in richness and reminiscent of past disturbance regimes. Exotics were represented by localised groves of tall *Eucalyptus camaldulensis* (Invader: Category 2) and *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Lycium hirsutum</i>	<i>Sida repens</i> , <i>Pentzia incana</i> , <i>Eriocapellatus ericoides</i>	<i>Eragrostis ichnangamini</i> (f)
Taxa of Conservation Interest:	None	
Ecological importance:	Low	
(f) – dominant taxa		

5.36.2 Fauna

The proposed loop expansion site was located in open disturbed karoo veld. Faunal activity in the area was low. During the field investigations 14 bird species and one mammal species were observed on site. Species included Anteatting Chat (*Myrmecocichla formicivora*), Chat Flycatcher (*Bradornis infuscatus*), Grey-backed Cisticola (*Cisticola sibiricapillus*) and Scrub Hare (*Lepus saxatilis*). For a complete species list refer to Appendix A. Blue Cranes (*Anthiropoides paradiseus*), which are listed as Vulnerable species, were observed foraging in close proximity to the study area. However, the construction of the loop extension at Wildfontein is unlikely to cause any major disturbance to fauna in the area.

Figure 5.37.2 Faunal evidence adjacent to site



Blue Cranes (*Anthropoides pumilius*) foraging in close proximity to the study areas



However, the use of the borrow material from the proposed borrow pit is unlikely to cause significant disturbance to fauna in the area provided activities remain localised.

5.38

25.2 BORROW PIT NEAR WILDFONTAIN

5.38.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open grassy plains dominated by a basal cover of secondary graminoid taxa pertaining to the genera *Sporobolus* and *Eragrostis*. The floristic composition comprised of dwarf, microphyllous forbs. Floral site characteristics include:

	
Woody (Trees & shrubs)	Herbaceous (forbs)
<i>Eriosephalus ericoides</i> (d), <i>Felicia muricata</i> (d), <i>Metelobium canalicum</i> , <i>Peritria hucum</i> , <i>Rosealia humilis</i> , <i>Rosealia glomerata</i>	<i>Sporobolus hirtus</i> (d), <i>Eragrostis lehmanniana</i> , <i>E. obtusa</i>
Taxa of Conservation Interest:	None
Ecological Importance:	Low
(d) – dominant taxa	

5.38.2 Fauna

The proposed borrow pit, which was an existing pit, was located in open Karoo veld, further from the Wildfontein loop in comparison to the previous borrow pit. Faunal activity on site, particularly mammal activity, was high. Evidence of faunal activity included:

Figure 5.38.2 Faunal evidence



Porcupine (*Hystrix africaeaustralis*) droppings

Scrub Hare (*Lepus sordidus*) droppings

During the field investigations nine bird species and five mammal species were observed, or evidence of their presence was observed. Species included Anteating Chat (*Mymecocichla formicivora*), Eastern Clapper Lark (*Mirafra fasciolata*), Kalahari Scrub Robin (*Erythropgia pinnis*), Porcupine (*Hystrix africaeaustralis*) and Aardvark (*Oryzictops oler*). Blue Cranes (*Anthropoides pumilius*), which are listed as Vulnerable species, were observed foraging in close proximity to the study area. However, the use of the borrow material from the proposed borrow pit is unlikely to cause significant disturbance to fauna in the area provided activities remain localised.

5.39

26. LINDE

5.39.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open grassy plains dominated by a basal cover of secondary graminoid taxa pertaining to the genera *Aristida* and *Eragrostis*. The floristic composition comprised of dwarf, microphyllous forbs reflecting past disturbance regimes. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
	<i>Pentzia incana</i> (d), <i>Pteronia glimca</i> , <i>Salvia repens</i> , <i>Schulbirtia pinnatifida</i> , <i>Cazania krebsiana</i>	<i>Bromus pectinatus</i> (d), <i>Eragrostis cirrata</i> (d), <i>E. bicolor</i> (d), <i>E. lehmanniana</i> , <i>Aristida</i> <i>diffusa</i>

Taxa of Conservation Interest	None
Ecological importance:	Low
(d) – dominant taxa	

5.39.2 Fauna

The proposed loop expansion site was located in open disturbed karoo veld. Faunal activity in the area was low. During the field investigations 10 bird species and four mammal species were observed, or evidence of their presence was observed. Species included African Pipit (*Anthus chinamanensis*), Cape Longclaw (*Macronyx capensis*), Eastern Clapper Lark (*Mirafra fasciolata*), South African Ground Squirrel (*Xerus inornatus*) and Steenbok (*Raphiceros campestris*). For a complete species list refer to Appendix A. A Lanner Falcon (*Falco biarmicus*), which is listed as a Near Threatened species, was observed foraging in the vicinity of the site. However, the construction of the loop extension at Linde is unlikely to cause any major disturbance to fauna in the area.

5.40

27. HANOVER ROAD

5.40.1 Flora

The study site showed signs of frequent anthropogenic disturbances to the extent that a phytosociological study was deemed unnecessary. The floristic composition comprised mainly of secondary grass taxa and ruderal forb species. Exotics were represented by localised groves of tall *Pinus* spp. and *Eucalyptus camaldulensis* (Invader: Category 2).

5.40.2 Fauna

The proposed new loop site was surrounded by disturbed vegetation, which was the likely factor for limited faunal activity in the area. During the field investigations only seven bird species were observed at the site, these include Hadedda Ibis (*Bostrychia ingens*), Pied Crow (*Corvus albus*) and Black-shouldered Kite (*Mitris aeneiventris*). For a complete species list refer to

Appendix A. No Red Data species were recorded on site. The construction of the new loop at Hanover Road is unlikely to cause any major disturbance to fauna in the area.

5.41

27.1 HANOVER ROAD BORROW PIT

5.41.1 Flora

The study site coincided with the Nama-Karoo Biome and comprised of open grassy plains dominated by a basal cover of secondary graminoid taxa pertaining to the genus *Eragrostis*. The floristic composition consisted of a diverse layer of dwarf, microphyllous forbs. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
	<i>Rosetta launilis</i> (d), <i>Pentzia incana</i> (d), <i>Ruschia spinosa</i>	<i>Eragrostis burginani</i> (d)

Taxa of Conservation Interest: *Ruschia spinosa*, *Humopsis* sp.

Ecological importance: Medium

(d) – dominant taxa

5.41.2 Fauna

The proposed borrow pit, which was an existing pit, was located in open karoo veld. Faunal activity on site, particularly mammal activity, was high. During the field investigations eight bird species and six mammal species were observed, or evidence of their presence was observed. Species included African Pied Starling (*Spyro bicolor*), European Bee-eater (*Merops apiaster*), Pale-winged Starling (*Omychogaster rubrocap*), Springhare (*Pedetes capensis*) and Suricate (*Suricata suricatta*). For a complete species list refer to Appendix A. No Red Data species were recorded on site, however, possible evidence of Cape Fox (*Vulpes chama*), a protected species, was recorded. However, the use of the borrow material from the proposed borrow pit is unlikely to cause significant disturbance to fauna in the area provided activities remain localised.

28. BURGERVILLEWEG

5.42.1 Flora

The study site showed signs of frequent anthropogenic disturbances to the extent that a phytosociological study was deemed unnecessary. The floristic composition comprised primarily of secondary grass taxa and ruderal forb species. Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Nemisia fruticans</i> (d), <i>Portulaca incana</i> , <i>Peltica muricata</i>	<i>Fingerhuthia africana</i> (d), <i>Erigeronites lahmuntiana</i> , <i>E. bicolor</i>	
Taxa of Conservation Interest:	None	
Ecological importance:	Low	
(d) - dominant taxa		

5.42.2 Fauna

The proposed loop expansion site was located in open disturbed Karoo veld. Faunal activity at the site was low, however, in the general vicinity of the study area faunal activity was relatively high. During the field investigations seven bird species and five mammal species were observed, or evidence of their presence was observed. Species included Rock Martin (*Prinoid filigula*), Southern Pale Chanting Goshawk (*Melierix canoris*), Scrub Hare (*Lepus saxatilis*) and Black-backed Jackal (*Canis mesonelas*). For a complete species list refer to Appendix A. Blue Cranes (*Anthropoides parvirostris*) and Ludwig's Bustard (*Neotis ludwigi*), which are listed as Vulnerable species, were recorded foraging in the general vicinity of the study area. However, even with the Red Data species foraging nearby the construction of the loop extension at Burgerwillweg is unlikely to cause any major disturbance to fauna in the area provided construction activities remain within the railway reserve and disturbed areas adjacent to the reserve.

29. BLETTERMAN

5.43.1 Flora

The study site showed signs of frequent anthropogenic disturbances to the extent that a phytosociological study was deemed unnecessary. The floristic composition comprised of secondary grass taxa and ruderal forb species. Exotics were represented by *Argemone ochroleuca* (Weed: Category 1). Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Portulaca incana</i> (d)	<i>Erigeronites lahmuntiana</i> (d), <i>Cynodon dactylon</i> , <i>E. bicolor</i>	
Taxa of Conservation Interest:	None	
Ecological importance:	Low	
(d) - dominant taxa		


5.43.2 Fauna

The proposed loop expansion site was located in open disturbed Karoo veld. Faunal activity at the site was low. During the field investigations seven bird species and two mammal species were observed, or evidence of their presence was observed. Species included Southern Pale Chanting Goshawk (*Melierix canoris*), Cape Sparrow (*Prasser melanurus*), Black-backed Jackal (*Canis mesonelas*) and South African Ground Squirrel (*Xerus inauris*). For a complete species list refer to Appendix A. No Red Data species were recorded on site, however, Ludwig's Bustards (*Neotis ludwigi*), which are listed as Vulnerable species, were recorded foraging in the general vicinity of the study area. However, even with the Red Data species foraging nearby the construction of the loop extension at Bletterman is unlikely to cause any major disturbance to fauna in the area provided construction activities remain within the railway reserve and disturbed areas adjacent to the reserve.

29.1 BLETTERMAN ROAD BORROW PIT

5.44.1 Flora

The study site coincided with the Nama-Karoo Biome (more particularly the Northern Upper Karoo) and comprised of open grassy plains dominated by a basal cover of secondary graminoid taxa of the genera *Aristida* and *Erigeronites*. The floristic composition consisted of a diverse layer of dwarf, microphyllous forbs. Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
	<i>Portulaca musana</i> (d), <i>Ruscina spinosa</i> , <i>Rosenthalia hirsuta</i> , <i>Salsola callina</i> , <i>Pithehus barotensis</i>	<i>Eriopogon aeternus</i> (d), <i>Erigeronites lahmuntiana</i> , <i>E. bicolor</i> , <i>E. bergiana</i>
Taxa of Conservation Interest:	<i>Ruscina spinosa</i>	
Ecological importance:	Low	
(d) - dominant taxa		

5.44.2 Fauna

The proposed borrow pit, which was an existing pit, was located in open Karoo veld approximately 10km south of De Aar, adjacent to the N10. Faunal activity on site was low. During the field investigations five bird species and

two mammal species were observed, or evidence of their presence was observed. Species included Common Kestrel (*Falco tinnunculus*), Southern Pale Chanting Goshawk (*Melierix cineris*) and Eastern Clapper Lark (*Mirafra fasciolata*). For a complete species list refer to Appendix A. The use of the borrow material from the proposed borrow pit is unlikely to cause significant disturbance to fauna in the area.

30. HOTAZEL YARD (INCLUDING HOTAZEL TIE IN OF TRIANGLE)

5.45.1 Flora - Hotazel Yard

The study site coincided with the Eastern Kalahari Savanna of which the surrounding vegetation comprised of short, mixed *Acacia* thornveld on deep Cenozoic sand (Kalahari Group). A basal cover of secondary taxa pertaining to the genus *Stipagrostis* dominated the grassy layer. The forb composition was poorly defined as reflected by past disturbance regimes. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia tortilis</i>	<i>Chrysocoma ciliana</i> , <i>Helictotrisum argyrosphaerum</i> , <i>Nemesia cf. fruticosa</i>	<i>Stipagrostis triplipennis</i> , <i>Eriopogon scoparius</i> , <i>Schmidtia pappophoroides</i>
Taxa of Conservation interest:	<i>Acacia erioloba</i> – DWAF protected	<i>Acacia laurifolia</i> – DWAF protected, BIT
Ecological importance:	Low	Low
(d) – dominant taxa		
BIT – Biogeographically important taxon endemic to the Kalahari (Mucina & Rutherford, 2006)		

5.45.2 Flora - Hotazel Tie in of Triangle

The study site coincided with the Eastern Kalahari Savanna and comprised of short, dense *Acacia* thornveld dominated by *Acacia mellifera* shrub. The encroachment of *A. mellifera* illustrated how habitat transformation (by means of anthropogenic activities) has benefited the formation of near-impenetrable stands of this woody shrub. The forb composition was poorly defined as reflected past disturbance regimes. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia mellifera</i> (d), <i>Acacia tortilis</i> , <i>Acacia laurifolia</i>	<i>Senecio consanguinolentus</i> (d), <i>Chrysocoma ciliana</i> , <i>Felicia muricata</i> , <i>Helictotrisum argyrosphaerum</i>	<i>Eriopogon scoparius</i> , <i>Schmidtia pappophoroides</i> , <i>Stipagrostis uniplumis</i>
Taxa of Conservation interest:	<i>Acacia laurifolia</i> – DWAF protected, BIT	
Ecological importance:	Low	
(d) – dominant taxa		
BIT – Biogeographically important taxon endemic to the Kalahari (Mucina & Rutherford, 2006)		

5.45.3 Fauna

The railway yard (including the tie in triangle) is located approximately 3km south of the town of Hotazel, where majority of the habitat has been transformed. The faunal activity, particularly mammal activity, adjacent to the study area was high. However, within the study area there was very little fauna activity. During the field investigations nine bird species, seven mammal species and one reptile species were observed, or evidence of their presence was observed adjacent to the study area. Species included European Bee-eater (*Merops apiaster*), Red-breasted Swallow (*Hirundo senitrijsi*), Common Mole-rat (*Cryptomys hottentotus*), Springhare (*Pedetes capensis*) and Southern Rock Agama (*Agama atra*). For a complete species list refer to Appendix A. No Red Data species were recorded on site, however, South African Hedgehog (*Aizlerix frontalis*), which is listed as Near Threatened, was recorded in the general vicinity of the study area. The proposed upgrades to the Hotazel yard (including the tie in triangle) are unlikely to cause a significant disturbance to fauna in the area.

31. MAMATHWANE YARD

5.46

5.46.1 Flora - Mamathwane Loops

The study site coincided with the Eastern Kalahari Savanna and comprised of short, open *Acacia* thornveld on deep Cenozoic sand (Kalahari Group). A basal cover of secondary taxa pertaining to the genus *Stipagrostis* dominated the grassy layer. The forb composition was poorly defined as reflected by past disturbance regimes. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (Forbs)	Graminoid (Grass & Sedge)
<i>Acacia mellifera</i> , <i>Acacia hebecarpa</i>	<i>Chrysosoma citrinum</i> , <i>Lagerflora decurrens</i> , <i>Sesuvium triphyllum</i> , <i>Hemimantia tomentosa</i> , <i>Tribulus cf. tenuissimus</i> , <i>Hippichium granatoides</i> , <i>Elephantorrhiza elephanthin</i>	<i>Stipagrostis uniplumis</i> , <i>Schmidtia pappophoroides</i> (d), <i>Cynodon dactylon</i>
Taxa of Conservation Interest:	None	
Ecological Importance:	Low	

5.46.2 Flora - Middleplains Take-off

The study site coincided with the Eastern Kalahari Savanna and comprised of short, open *Acacia* thornveld on deep Cenozoic sand (Kalahari Group). A basal cover of secondary taxa pertaining to the genus *Stipagrostis* dominated the grassy layer. The forb composition was poorly defined. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (Forbs)	Graminoid (Grass & Sedge)
<i>Acacia mellifera</i> , <i>Acacia haematoxylon</i>	<i>Felicia muricata</i> , <i>Gnida polycephala</i> , <i>Senecio heterophyllus</i> , <i>Senecio triphyllum</i>	<i>Eriosegona scoparia</i> , <i>Eragrostis haematoxylon</i> – DWAF protected, BIT
Taxa of Conservation Interest:		
Ecological Importance:	Low	

(d) – dominant taxa
BIT – Biogeographically important taxon endemic to the Kalahari (Mucina & Rutherford, 2006)

5.46.3 Fauna

The railway yard (loops and middleplains take-off) is located approximately 22km south of the town of Hotazel, where majority of the habitat has been transformed. The faunal activity within the study area was low. During the field investigations four bird species and three mammal species were observed, or evidence of their presence was observed adjacent to the study area. Species included Pied Crow (*Corvus albus*), Laughing Dove (*Streptopelia senegalensis*) and Slender Mongoose (*Galerella sanguinea*). For a complete species list refer to Appendix A. No Red Data species were recorded on site, however, South African Hedgehog (*Atilax frontalis*), which is listed as Near Threatened, was recorded on route to the study area. The proposed upgrades to the Marnathwane yard (loops and middleplains take-off) are unlikely to cause a significant disturbance to fauna in the area.

5.47

32. POSTMASBURG YARD (INCLUDING PMG ELECTRIFYING LINE)

5.47.1 Flora

The study site coincided with Kuruman Thornveld and comprised of short, open *Acacia* thornveld with a basal cover of mid-successional graminoid taxa pertaining to the genus *Eriosegona*. The forb composition reflected past disturbance regimes. Floral site characteristics include:



Woody (Trees & shrubs)	Herbaceous (Forbs)	Graminoid (Grass & Sedge)
<i>Acacia mellifera</i> (d), <i>Lydenia cicerum</i> , <i>Torricolobium camphoris</i>	<i>Felicia muricata</i> , <i>Gnida polycephala</i> , <i>Alcea grandidentata</i> , <i>Eriosegona scoparia</i> , <i>Hippichium granatoides</i>	<i>Eriosegona scoparia</i> (d)
Taxa of Conservation Interest:	None	
Ecological Importance:	Low	

5.47.2 Fauna

The railway yard is located approximately 3km north of the town of Postmasburg, where majority of the vegetation is disturbed. The faunal activity within the study area was low. During the field investigations two bird species and two reptile species were observed on site. These included Cape Sparrow (*Passer melanurus*), Cape Turtle Dove (*Streptopelia capicola*), Puff

Adder (*Bitis arietans*) and Ground Agama (*Agama natalensis*). The proposed upgrades to the Postmasburg yard (including PMG Electrifying line) are unlikely to cause a significant disturbance to fauna in the area.

33. RONALDSVLEI & BEACONSFIELD YARDS

5.48

5.48.1 Flora

Both sites corresponded to an industrial area. The botanical importance of these areas was insignificant.

5.48.2 Fauna

The Ronaldsvlei change-over yard and the Beaconsfield electric locomotive running shed are located approximately 5km south of Kimberley. Faunal activity within the study area was low. During the field investigations 16 bird species were observed on site. These included Bokmakierie (*Telophorus zeylonus*), Cape Longclaw (*Macropygia capensis*), Crimson-breasted Shrike (*Laniarius atrocacciniensis*) and Fiscal Flycatcher (*Sigelus sibilans*). For a complete species list refer to Appendix.... No Red Data species were recorded on site. The proposed upgrades to the Ronaldsvlei change-over yard and the Beaconsfield electric locomotive running shed are unlikely to cause a significant disturbance to fauna in the area.

5.49

34 EMTL

5.49.1 Flora

The study site coincided with the Eastern Kalahari Savanna and comprised of short, open *Acacia* thornveld that was dominated by secondary graminoid taxa pertaining to the genera *Eragrostis*, *Stipagrostis* and *Cenchrus*. The forb composition comprised of dwarf species, mainly members of the Asteraceae. Floral site characteristics include:

Woody (Trees & shrubs)	Herbaceous (forbs)	Graminoid (Grass & Sedge)
<i>Acacia mellifera</i> (d), <i>Tarchonanthes camphorites</i> , <i>Lycium cinereum</i> , <i>Diospyros</i> <i>lygdoides</i>	<i>Falcia muricata</i> (d), <i>Peritza incana</i> (d), <i>Zygophyllum pubescens</i> , <i>Lycium decurans</i> , <i>Chrysocoma</i> <i>altata</i> , <i>Geigeria orantoides</i> , <i>Hermannia laniflora</i>	<i>Stipagrostis uniplumis</i> , <i>Cenchrus</i> <i>chirius</i> , <i>Eragrostis echinoclada</i>

Taxa of Conservation Interest:	None
Ecological Importance:	Low
(d) – dominant taxa	

5.49.2 Fauna

The proposed new Transnet Freight Rail traction substation at Emil is located approximately 35km south of Mamathwane. Faunal activity within the study was low. During the field investigations nine bird species and four mammal species were observed, or evidence of their presence was observed on site. Species included African Red-eyed Bulbul (*Pycnonotus nigricans*), Greater Kestrel (*Falco rupicoloides*), Lesser Grey Shrike (*Lanius minor*), Porcupine (*Hystrix africanus*) and Scrub Hare (*Lepus saxatilis*). For a complete species list refer to Appendix A. No Red Data species were recorded on site, however, possible scorpion burrows (*Opisthoplatys* spp. – protected species) were located in the vicinity of the study area. The construction of a new substation at Emil is unlikely to cause significant disturbance to fauna in the area.

REFURBISHMENT OF THE KIMBERLEY – DE AAR SECTION

5.50

5.50.1 Flora

The rail section between Kimberley and De Aar comprises mainly of low shrub dominated by *Rhus burchellii*, *Rhigozum trichotomum*, *Lycium chierium* and the spinescent shrub *Asparagus cf. aethiopicus*. However, large sections along the servitude were previously disturbed, mainly due to overstocking of livestock as evidenced by the near-homogenous stands of *Rhigozum trichotomum*.

A number of alien invader and weed species were observed along the rail servitude and noteworthy species include *Eucalyptus camillitensis* (invader; Category 2), *Pennis* spp. (Invader; Category 2), *Agave americana* (Invader; Category 2), *Opuntia ficus-indica* (Weed; Category 1), *O. inbriata* (Weed; Category 1) and *Nicotiana glauca* (Weed; Category 1).

5.50.2 Fauna

The proposed refurbishment of the De Aar to Kimberley section of the railway line was assessed by driving the route. Fauna observed are listed in Table 5.50.2.

Table 5.50.2 Faunal species observed or evidence of their presence observed along the De Aar to Kimberley section.

COMMON NAME	SCIENTIFIC NAME	STATUS
BIRDS		
African Hoopoe	<i>Upupa africana</i>	LC
African Pied Starling	<i>Sphen bicolor</i>	LC
Anteating Chat	<i>Myrmecocichla formicivora</i>	LC

COMMON NAME	SCIENTIFIC NAME	STATUS
Barn Swallow	<i>Hirundo rustica</i>	LC
Black - shouldered Kite	<i>Mitras caerules</i>	LC
Cape Longclaw	<i>Macropygia capensis</i>	LC
Cape Turtle Dove	<i>Streptopelia capicola</i>	LC
Cape Weaver	<i>Ploceus capensis</i>	LC
Chestnut - backed Sparrowlark	<i>Eremophila leucotis</i>	LC
Common Fiscal	<i>Lanius borealis</i>	LC
Eastern Clapper Lark	<i>Mirafra fasciata</i>	LC
Greater Striped Swallow	<i>Hirundo caerulea</i>	LC
Helmeted Guineafowl	<i>NNumida meleagris</i>	LC
Jackal Buzzard	<i>Buteo ruficeps</i>	LC
Kalahari Scrub Robin	<i>Erythropoga erythraea</i>	LC
Karoo Scrub Robin	<i>Streptopelia senegalensis</i>	LC
Laughing Dove	<i>Falco nanumani</i>	YU
Lesser Kestrel	<i>Octia capensis</i>	LC
Namqua Dove	<i>Sturnio caninus</i>	LC
Ostrich	<i>Onychognathus indouroup</i>	LC
Pale - winged Starling	<i>Corvus albus</i>	LC
Pied Crow	<i>Hirundo semirufa</i>	LC
Red - breasted Swallow	<i>Ptilinopus sochus</i>	LC
Social Weaver	<i>Aphris afra</i>	LC
Southern Black Korhaan	<i>Ploceus velutius</i>	LC
Southern Masked Weaver	<i>Melospiza canotius</i>	LC
Southern Pale - chanting Goshawk	<i>Euphates oryx</i>	LC
Southern Red Bishop		
MAMMALS		
Aardvark	<i>Orycteropus afer</i>	LC
Aardwolf	<i>Proteles cristatus</i>	LC
Cape Porcupine	<i>Hystrix africaeaustralis</i>	LC
Common Drinker	<i>Sylvicapra grimmia</i>	LC
Scrub Hare (check black tip on ears)	<i>Lepus saxatilis</i>	LC
South African Ground Squirrel	<i>Xerus inauris</i>	LC
Springbok	<i>Antidorcas namosyrindis</i>	LC
Steenbok	<i>Raphicerus campestris</i>	LC
Yellow Mongoose	<i>Cynictis penicillata</i>	LC
REPTILES		
Ground Agama	<i>Agama aethiops</i>	LC

The refurbishment of the route from De Aar to Kimberley is unlikely to cause significant disturbance to fauna.

BROAD OVERVIEW OF THE VEGETATION ASSEMBLAGES/UNITS

5.51

5.51.1

Rationale

A number of proposed borrow pits were sampled and phytosociologically analysed to provide a better description of contemporary vegetation assemblages likely to occur along the freight line servitude. The outcome of such an exercise will provide more detail with regards to the floristic structure and compositional relationship among plant taxa than referring to the Vegetation Map of Mucha & Rutherford (2006) alone. However, the results merely allow for broad descriptions and should not be interpreted in the localised context.

5.51.2

The borrow pit localities were chosen since these were surrounded by natural vegetation.

Vegetation Units/Assemblages

Based on the results of the ordination analysis, five distinct vegetation units were discernable (Figure 5.51). All of these tend to correlate well with current physiogeographical patterns such as those derived from the deep sands of the Mega-Kalahari basin, the arid Nama-Karoo basin and the Albany phytochorion.

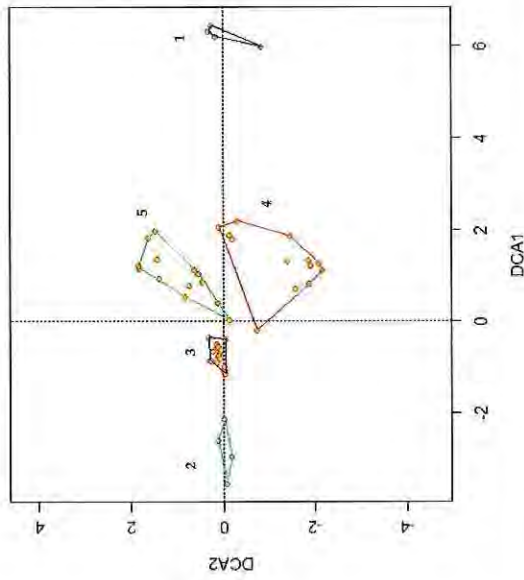
These include:

1. *Acacia laurifolia* - *Acanthosicyos namibianus* - *Schmidtia pappophoroides* open woodland;
2. *Euclea undulata* - *Cynodon cf. dactylon* thicket;
3. *Felicia muricata* - *Aristida diffusa* transitional scrubland;
4. *Pentzia uranum* - *Roseria humilis* Karroid bossveld; and
5. *Eriocaulon ericoides* - *Aristida adscensionis* open bossveld.

Appendix B provides an inventory of all plant taxa recorded during the survey period.

Figure 5.51

A Detrended Correspondence Analysis (DCA) of 52 sampling plots showing 5 distinct floral assemblages pertaining to natural vegetation along selected borrow pits



1. *Acacia haematoylon* – *Acanthosicyos naudinianus* – *Schmidia pappophoroides* open woodland

This assemblage occurred on deep aeolian sand of the Kalahari basin and was particularly dominant near the town of Hotazel and Mamathwane. Structurally it was composed of a short, open woodland with a sparse field layer (depending on the amount of rainfall) of hardy, drought-tolerant taxa. Many of these contain underground storage mechanisms to restrict the loss of water. This unit could be described as a mixed microphyllous woodland dominated by the genus *Acacia*, in particular *A. haematoylon*, *A. erioloba*, *A. tortilis* and *A. hebeclada*, with a sparse to dense graminoid cover, depending on the preceding rainfall. The graminoid composition was biased towards arid-adapted grass species such as *Schmidia pappophoroides*. Other noteworthy graminoid taxa include *Stipagrostis imbricatis*, *Anthephora pubescens* and *Eragrostis lehmanniana*. Forb richness was poor and comprised mainly of *Acanthosicyos naudinianus* (a common creeper in the Kalahari), *Hernandia tomentosum* and *Gnifia polyccephala*. Typical floristic characteristics include:

Typical Species	% Contribution	Average abundance (based on mean cover/plot)
<i>Schmidia pappophoroides</i>	86.45	69.25
<i>Acanthosicyos naudinianus</i>	12.56	14.06
Stratum		
Tree	25.25	4
Shrub	17.25	1.5
Field	26.5	-
Herb	15	0.3
Grass	85	0.75
Total cover:	±70%	
Borrow Pit #	30.1 Hotazel	

2. *Euclea imbilata* – *Cynodon cf. dactyloides* thicket

This assemblage occurred on shallow soils, mainly calcrete and limestone, along the southern extremity of the study area. It was located within the Albany Centre of floristic Endemism as illustrated by the high richness and endemism of forb taxa (e.g. *Rhombophyllum rhomboides*). Structurally it was composed of short, dense bush clumps (e.g. *Euclea imbilata*, *Gymnosporia capitata*, *Scleria sp.*, *Sideroxylon ierme* and *Grewia robusin*) interspersed by a dry graminoid cover dominated by stoloniferous species such as *Cynodon cf. dactyloides*. The composition showed a high prevalence of succulent and spinescent foras that were especially evident within the families Crassulaceae, Euphorbiaceae, Asphodelaceae (*Aloe*) and Mesembryanthemaceae.

Other noteworthy species include *Asparagus striatus*, *Stipa dregeana*, *Ruschia hamata*, *Rhus incisa* and *Aloe ferax*.

Typical floristic characteristics include:

Typical Species	% Contribution	Average abundance (based on mean cover/plot)
<i>Cynodon cf. dactyloides</i>	68.98	33.19
<i>Euclea imbilata</i>	13.53	11.59
<i>Gymnosporia capitata</i>	5.84	7.50
<i>Bectium brachellianum</i>	3.31	5.96
Stratum		
Tree	18.73	3.5
Shrub	37.00	1.88
Field	11.25	-
Herb	45	0.3
Grass	55	0.23
Total cover:	±66.5%	
Borrow Pit #	1.1 Barkley Bridge	

3. *Felicia muricata* – *Aristida diffusa* transitional scrubland

This assemblage was typical of slightly undulating plains and broken terrain (or topography) with the exception being the Cookhouse borrow pits which were located on flat plains. It was found primarily on medium to shallow gravelly soils. Interestingly, this assemblage showed both floristic affinities to the Albany Thicket Biome and the Nama-Karoo Biome. It thus represents a transitional scrub with a floristic composition shared among thicket (*Euclea undulata* – *Cynodon cf. dactylon* thicket) and Karroid vegetation types (*Pentzia incana* – *Roseina humilis* Karroid bossieveld and *Eriocarpus ericoides* – *Aristida adscensionis* open bossieveld) (therefore very similar in composition to the Albany Broken Veld). It was mainly centred in the Eastern Cape Province south of the Great Escarpment. The main drivers differentiating the observed composition from the upper Karoo floras are believed to be a combination of varied topography (aspect) and rainfall patterns (increased precipitation to the south) as dictated by the surrounding landscape.

The woody layer was poorly defined consisting of the genera *Rhus*, *Acacia*, *Gymnosporia* and *Gerania*. Typical herbaceous taxa include *Felicia muricata*, *Asparagus striatus* and *Eriocarpus ericoides*. Typical graminoid taxa include *Aristida diffusa*, *Eriogonum obtusum*, *E. racemosum*, *E. bergiana* and the occurrence of *Gynthopogon pappichili* and *Themeda triandra* on areas with steeper gradients.

Typical floristic characteristics include:

Typical Species	% Contribution	Average abundance (based on mean cover/plot)
<i>Felicia muricata</i>	35.35	16.72
<i>Becium burckellianum</i>	15.52	8.93
<i>Eriogonum obtusum</i>	15.37	12.76
<i>Aristida diffusa</i>	12.72	7.97
<i>Eriocarpus ericoides</i>	11.95	8.64
Stratum		
Tree	3.1	1.87
Shrub	2.6	0.62
Field	49.5	
Herb	45.0	0.35
Grass	51.1	0.80
Total cover:	455.2%	
Borrow Pit #	101 Cookhouse, 102 Cookhouse, 141 Marlow, 161 Knutsford (in part), 162 Knutsford	

4. *Pentzia incana* – *Roseina humilis* Karroid bossieveld

This assemblage corresponded to a large area of flat plains between the towns of Middelburg and De Aar. It represents a floristic composition typical of the Upper Karoo (mainly Nama-Karoo Biome) and was structurally very similar to the *Eriocarpus ericoides* – *Aristida adscensionis* open bossieveld. However,

the observed slight reduction in the graminoid layer was best explained by a combination of below-average rainfall, and the trampling and indiscriminate stocking practices of livestock leading to the excessive proliferation of bossieveld (*Pentzia incana* and *Roseina humilis*). The woody layer was absent while the majority of the graminoid composition consisted of annual or mid-successional taxa such as the genera *Aristida* and *Eriogonum*.

Typical graminoid taxa include *Eriogonum lehmannianum*, *E. bergiana*, *Sporobolus lundugii*, *Eriogonum desmanxii* and *Aristida adscensionis*. Noteworthy forb species include *Eriocarpus ericoides*, *E. spinosus*, *Ruschia spinosa* and *Phytolacca latroctis*.

Typical floristic characteristics include:

Typical Species	% Contribution	Average abundance (based on mean cover/plot)
<i>Pentzia incana</i>	57.06	29.17
<i>Roseina humilis</i>	24.17	9.93
<i>Eriogonum spinosum</i>	5.43	5.72
<i>Eriogonum bergianum</i>	5.01	10.09
Stratum		
Tree	0.08	2.0
Shrub	0.38	1.2
Field	48.27	
Herb	52.3	0.25
Grass	47.7	0.25
Total cover:	449.2%	
Borrow Pit #	25.1 Widdowson, 27.2 Hanover Road, 29.1 Blesboman	

5. *Eriocephalus ericoides* – *Aristida adscensionis* open bossieveld

This assemblage was in many respects indifferent to the *Penzilia inana* – *Rosenia humilis* karroid bossieveld, although the graminoid layer was better preserved and floristically more species rich. However, the differences were subtle. This assemblage occurred between Cradock and Middelburg, but was also patchily distributed between De-Aar and Middelburg, making the geographic delineation thereof problematic. It also represents a floristic composition typical of the Upper Karoo (mainly Nama-Karoo Biome).

Typical graminoid taxa include *Aristida adscensionis*, *Eragrostis obtusa*, *E. lehmanniana*, *E. bergiana* and *Sporobolus ludiugii*. Noteworthy forb species include *Eriocephalus ericoides*, *Felicla muricata* and *Rosenia humilis*.

Typical floristic characteristics include:

Typical Species	% Contribution	Average abundance (based on mean cover/plot)
<i>Eriocephalus ericoides</i>	42.51	15.61
<i>Aristida adscensionis</i>	19.66	13.83
<i>Felicla muricata</i>	12.65	7.08
<i>Sporobolus ludiugii</i>	10.65	7.25
<i>Eragrostis lehmanniana</i>	4.03	4.68
<i>Aristida diffusa</i>	4.00	6.72
Stratum	Average cover (%)	Height (m)
Tree	1.0	2.6
Shrub	15.5	1.7
Field	29.7	-
Herb	38.6	0.3
Grass	60.7	0.4
Total cover	±46.2%	
Borrow Pit #	17.1 Visniver Collectie quarry, 18.2 Comway, 25.2 Wildfontein	

5.52

CONSERVATION IMPORTANT SPECIES (RED DATA, ENDEMICS, PROTECTED)

Within this section, species listed have been extracted from the various literature sources mentioned in Section 2.2 and may, therefore, occur within the study region and potentially at the different sites.

5.52.1

Floristic Species

South Africa has been recognised globally as having a remarkable plant diversity with high levels of endemism. Almost ten percent of the earth's plants are found within South Africa approximating 23 420 species (Golding, 2002). Of the 948 taxa assessed, 414 species that are 'threatened with extinction, while 270 of these have populations with extremely localised geographic distributions (Golding, 2002).

In terms of conserving biodiversity, there has been a shift towards focussing on ecosystems and landscapes (habitats) rather than efforts in conserving specific species. This is the case due to the variety of living organisms, which make up ecosystems relying on suitable habitats to which they have become adapted over long periods of time. Habitat degradation is one of the main reasons for species becoming extinct in a particular area. However, it can be viewed that threatened species are seen as indicators of the overall health of an ecosystem and serve, with varying degrees of success, as 'umbrellas' for the protection of other organisms as well as ecosystems (Hilton-Taylor, 1996; 2000). According to Hilton-Taylor (1996) threatened species can be seen as biodiversity attention grabbers. The Threatened Plant Species Programme (TSP) is currently revising all threatened plant species assessments made by Craig Hilton-Taylor (1996) using IUCN Red Listing Criteria modified from Davis *et al.* (1986).

Red Data Species

When looking at conservation important floristic species, there are two main listings within South Africa that are currently being utilized. Firstly there is the TSP on a national level for the conservation and protection of Red Data species. The TSP has identified the most up-to-date Red List status for each taxon (in October 2007) and it is advised by the National Biodiversity Institute that this be used until the new Red Data List is produced. It aims to facilitate the conservation of South Africa's rare and endangered species. Secondly there are the Protected Plant listings for each province. For the Eastern Cape, the combination of the legislation of the former Cape Province, Transkei and Ciskei was used to determine the protection status of plants in the Eastern Cape.

Eastern Cape

In terms of the TSP listing there are 36 Critically Endangered species within the Eastern Cape Province (9% of the National listings), 46 Endangered (7.92% of the National listings) and 118 Vulnerable species (10.48% of the National Listings) (Table 5.52.1a).

Northern Cape

Over 16% of the Nationally listed species are considered Vulnerable within the Northern Cape, 18 species are Critically Endangered and 31 species are Endangered (Table 5.52.1a).

(4) * Habitats normally comprise several biotopes or areas of uniformity (Davies & Day, 1998).

Table 5.52.1a The Number of Red Data Species found within the Eastern and Northern Cape provinces.

Status**	No. of Species in Eastern Cape	No. of Species in Northern Cape	Total (Nationally)	% of National	
				Eastern Cape	Northern Cape
CR	36	18	397	9.07	4.53
DD	95	97	655	14.5	14.81
Declining	-	8	37	0	21.62
EN	46	31	581	7.92	5.34
EX	6	1	36	16.67	2.78
NT	55	42	335	16.42	12.54
NT*	1	-	7	14.29	0
Rare	155	255	1288	12.03	19.8
STBA	10	9	210	4.76	4.29
YU	118	185	1126	10.48	16.43

** See Appendix C for a full description of each category

Near-threatened Taxa

The species *Rhomboophyllum rhomboidum*, *Euphorbia meliiformis* subsp. *valida* and *Cynathus smithii* are currently listed as "Near-threatened" based on an assessment conducted by the Threatened Species Programme (TSP, 2007) and Victor and Dold (2003). Both *R. rhomboidum* and *E. meliiformis* were only observed from site 1.1 Barkley Bridge Borrow Pit and were part of the *Enclita immitis* - *Cynodon cf. Inception* thicket. It is worth mentioning that the *Enclita* subspecies of *E. meliiformis* was recently listed as "Rare" by the Threatened Species Programme (TSP, 2007).

C. smithii, a geophyte, was observed from open and grassland (part of the *Felicis hirticola* - *Aristida diffusa* transitional scrubland) near the town of Cockhouse. This species was only recorded from sites 10.1 Cookhouse Borrow Pit and 10.2 Cookhouse Borrow Pit.

Protected Species

Table 5.52.1b provides a list of plant taxa protected by Schedule 4 of the Cape Nature and Environmental Conservation Ordinance (No. 19 of 1974). Please note that this ordinance, although old, is still applicable.

Table 5.52.1b A list of protected taxa observed from the study area.

Site	Protected Taxa
1. Barkley Bridge	All Mesembryanthemaceae:
1.1 Borrow pit Barkley Bridge	<i>Carpobrotus edulis</i>
2. Aard	<i>Delosperma edithianum</i>
3. Coerney	<i>Delosperma maliflorum</i>
5. Eagles Crag	<i>Delosperma rogersii</i>
	<i>Delosperma</i> sp.

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Site	Protected Taxa
8. Saltaire	<i>Drosanthemum hispidum</i>
9. Kommadagga	<i>Drosanthemum</i> sp.
13. Haleskloof	<i>Lamprolathus productus</i>
14. Marlow	<i>Melampyrum</i> sp.
14.1 Marlow Borrow Pit	<i>Mesembryanthemum nitens</i>
15. Kaplan	<i>Mesobolus</i> sp.
16.1 Knutsford Borrow Pit	<i>Pyllobolus spiriferus</i>
16.2 Knutsford Borrow Pit	<i>Pedicularis carolinum</i>
17. Vervier	<i>Pedicularis arctostaphylos</i>
18.1 Vervier: Collett se Quarry	<i>Rhomboophyllum rhomboidum</i>
18.1 Conway Borrow Pit	<i>Ruscia cradoensis</i> subsp. <i>cradoensis</i>
19. Glenheath	<i>Ruscia lanata</i>
20. Taitelberg	<i>Ruscia pteritifolia</i>
27 Hanover Road	<i>Ruscia sparsa</i>
29. Bleteman Borrow Pit	<i>Ruscia nitida</i>
	<i>Ruscia</i> sp.
	<i>Sonchitum</i> sp.
	<i>Titanopsis</i> sp.
	<i>Trichodiadema bulbosum</i>
	<i>Trichodiadema pumcradimum</i>
	<i>Trichodiadema</i> sp.

1.1 Borrow pit Barkley Bridge	<i>Euphorbia meliiformis</i> subsp. <i>valida</i>
1.1 Borrow pit Barkley Bridge	All Aloes except <i>Aloe ferox</i> :
5. Eagles Crag	<i>Aloe bromia</i>
6 Toetab	<i>Aloe humilis</i>
8. Saltaire	<i>Aloe speciosa</i>
9. Kommadagga	<i>Aloe striata</i>
10.2 Cookhouse Borrow Pit	<i>Aloe bursifer</i>
11. Klipfontein	
18.1 Conway Borrow Pit	All members of the genus <i>Hemerocallis</i> :
1.1 Borrow pit Barkley Bridge	<i>Hemerocallis atrovirens</i>
14.1 Marlow Borrow Pit	<i>Hemerocallis bolsonii</i> var. <i>blackburniana</i>
1.1 Borrow pit Barkley Bridge	All members of the genus <i>Pachygodium</i> :
5. Eagles Crag	<i>Pachygodium hispidum</i>
16.1 Knutsford Borrow Pit	<i>Pachygodium succulentum</i>
5. Eagles Crag	All <i>Amaryllidaceae</i> :
	<i>Brysonia striata</i>
	<i>Nerine cf. lexouana</i>
10.1 Cookhouse Borrow Pit	All <i>Amaryllidaceae</i> :
10.2 Cookhouse Borrow Pit	<i>Cynathus smithii</i>
14.1 Marlow Borrow Pit	All <i>Amaryllidaceae</i> :
	<i>Hemionathus humilis</i>
	<i>Cynathus contractus</i>
10.2 Cookhouse Borrow Pit	<i>Sisipha grandiflora</i> var. <i>grandiflora</i>

A permit is required to remove or disturb a protected plant. It is recommended that protected plants in danger of becoming destroyed during the construction phase be removed prior to the commencement of construction activities and translocated to suitable habitat, or used during the rehabilitation phase (refer to the impact assessment).

Three recorded species of tree (Table 5.52.1c) appear on the national list of declared protected tree species as promulgated by the National Forests Act, 1998 (No 94 of 1998). The main reasons for this list are to provide strict

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protection to certain species while others require control over harvesting and utilisation.

In terms of the National Forests Act of 1998, these tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Water Affairs and Forestry (or a delegated authority). Therefore, such activities (as mentioned above) should be directed to the responsible Forestry official in each province or area (please contact: Northern Cape: Ms Jackie Mans at Mansj@dtwat.gov.za and Eastern Cape: Ms or (054) 394 0201 or e-mail her at Mams1@dtwat.gov.za and Eastern Cape: Ms Gwen Sgwabe at Private Bag X7485, King Williams Town, 5600 or (043) 604 5400 or e-mail her at sgwabeG@dtwat.gov.za).

Table 5.52.1c A list of protected tree taxa observed from the study area.

Site	Protected Taxa
1.1 Barkley Bridge borrow Pit	<i>Sideroxylon thornei</i>
30. Hotazel	<i>Acania erialoha</i>
30.2 Hotazel The in of Triangle	<i>Acania inermisaxylon</i>
13.3 Middelplaats Take-off	

Endemics / Biogeographically Important Taxa

Whereas the classification and mapping of southern Africa's vegetation types have been the subject of numerous publications, the classification and mapping of the distribution patterns of the region's plant species have been neglected. This prompted the study by Van Wyk & Smith (2001) on identifying regions of floristic endemism in Southern Africa. The study area currently falls within two of these regions: The Albany Centre (Figure 5.52.1a) and the Griqualand West Centre (Figure 5.52.1b).

The Albany Centre

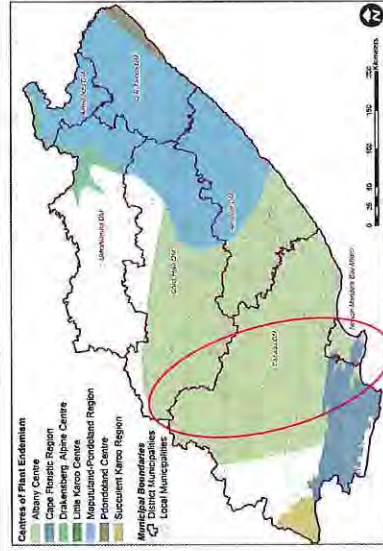
According to Cowling and Hilton-Taylor (1994) the country's protected areas are not well situated to conserve plant diversity and endemism as only 6.5% of the surface area of the Albany Centre falls into formally protected areas. In total, 126 taxa are threatened with extinction in the Albany Centre, and 6 are now extinct. A further 22 are listed as Data Deficient (DD). In the past, agriculture has been a severe threat to the survival of rare species in this part of the Eastern Cape; the main threats to the continuing existence of threatened plants in this area are illegal collecting, residential development and urban growth (Victor & Doid, 2003).

The study sites which fall within the Albany Centre include Sites 1 - 23 (including subsites).

The Griqualand West Centre

The centre represents approximately 1800 taxa (species and subspecies) of which more than 40 (2.2%) are considered endemic. There are 13 species listed as being endemic or near-endemic succulents (van Wyk & Smith 2001). A number of non-succulent species are also endemic / near-endemic to the Griqualand West Centre of Endemism (van Wyk & Smith 2001) including *Digitaria polyphylla*. The main threats to this region include bush encroachment and overgrazing by domestic livestock.

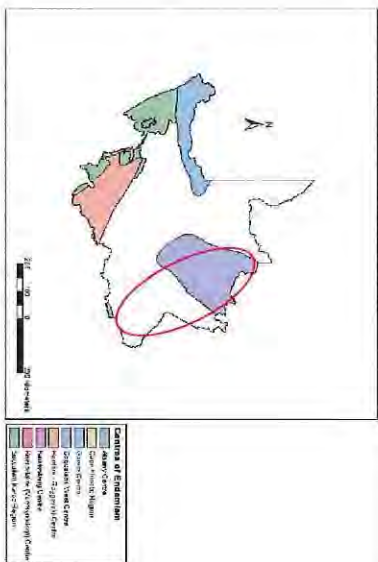
Figure 5.52.1a Centres and region of plant endemism occurring within the Eastern Cape



Source: Van Wyk & Smith, 2001

The study sites which fall within the Griqualand West Centre include Sites 30, 30.1, 30.2, 31, 31.3, 32, 32.1 and Site 34.

Figure 5.52.1b Centres and region of plant endemism occurring within the Northern Cape



Source: Van Wyk & Smith, 2001

According to Mucina & Rutherford (2006) endemic and biogeographically important taxa that could potentially be found at the specific sites are presented in Table 5.52.1d.

Table 5.52.1d The Different Sites within the Study Area and the Potential Biogeographically Important or Endemic Species that could occur.

Site	Biogeographically Important/ Endemic taxa
11.1 Borrow pit Barkley Bridge	Biogeographically important taxa include <i>Ficinia truncea</i> , <i>Trielium uniole</i> and <i>Gibberia sedm</i> . Endemic taxa include the succulent shrubs <i>Ephorbia glabosa</i> and <i>Rhombohyllum rhomboidum</i> , the low shrub <i>Argemone rigosum</i> and the geophytic <i>Ladobesia</i> sp. nov.
1 Barkley Bridge	Biogeographically important taxa: include the climbers <i>Ceropegia amplata</i> var. <i>amplata</i> and <i>Fockea striata</i> , the epiphytic parasite <i>Cuscuta bifurcata</i> and the geophyte <i>Palmgothium canepstre</i>
3 Coerney	The endemic species <i>Furcraea holoserica</i> , <i>Albizia crudioides</i> and <i>Valerbergia kosterensis</i> .
4 Verbyl	
5 Eagle's Crag	
6 Tootahi	
7 Blinkhof	
8 Saltaire	Biogeographically important species includes the succulent <i>Sarcocolla violacea</i> . Endemic taxa include <i>Brachystachya luteiventris</i> , <i>Oriobolus brittanica</i> , <i>Oriobolus pendulus</i> , <i>Heterotheca cynidiformis</i> var. <i>detusa</i> , <i>Ceropegia falkenii</i> subsp. <i>finlayana</i> , <i>Euphorbia thurmsii</i> var. <i>huttoniae</i> , <i>Rhombohyllum albanense</i> and <i>Rhombohyllum dreyeri</i> .
9 Kannaadagga	
10 Golden Valley	
10.3 Golden Valley possible borrow pit.	Endemic taxa which could occur within these sites include <i>Euphorbia canudana</i> , <i>Eurogops gracilipes</i> , <i>Himantia angustifolia</i> var. <i>paucifolia</i> , <i>Himantia cunninghamii</i> .
10.1 Road borrow pit near Cookhouse	
10.2 Cookhouse possible borrow	
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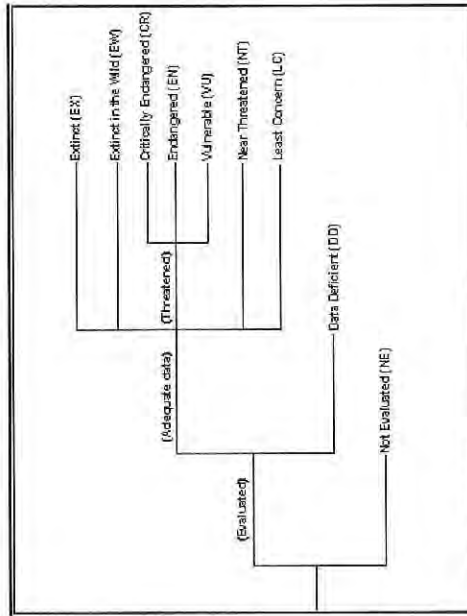
Site	Biogeographically Important/ Endemic taxa
11 Klipfontein	
11.1 Cutting as borrow pit	Endemic taxa which could occur within these sites include the species <i>Isotria medeoloides</i> .
12 Morner	
14.1 Marlow New borrow pit	
13 Halesowen	Endemic species such as <i>Chusatephyllum ruscifolium</i> , <i>Hertia diuifolia</i> , <i>Rabida albivola</i> , <i>Sesdia tetrandra</i> , <i>Pycnosperma scoparium</i> , <i>Aspidithus acridalis</i> subsp. <i>plumifolium</i> , <i>Sclero psaridites</i> , <i>Sclero calyptrifolium</i> .
16 Knutsford	
16.1 Knutsford Borrow material	
17 Versivier	
17.1 Versivier Collet se quarry	
17.2 Versivier possible borrow pit	
18 Conway	
18.2 Borrow Pit	
19 Glenheath	
20 Tafelberg	
21 Rosmead	
23 Carlton	
24 Barredale	
25 Wildfontein	
25.1 Borrow pit near Wildfontein	
26 Linde	
27 Hanover Road	
27.1 Level crossing to be moved	
27.2 Existing borrow pit	
14 Macdow	
22 Fionker	Biogeographically important Taxa: <i>Encephalartos friderici-guilelmi</i> , <i>Encephalartos giffenensis</i> , <i>Sarcobolus maritimus</i> .
28 Burgerwillow eg	Biogeographically important Taxa: <i>Convolvulus boecklerianus</i> , <i>Gymnospora szyszanowiczii</i> subsp. <i>manitobensis</i> . Endemic Taxa: <i>Lithops lobkeri</i> , <i>Stomatium pahrleris</i> , <i>Ariflexa sparganii</i> , <i>Calceola caliginosa</i> , <i>Mimulidra aseritica</i> .
29 Belemman	Biogeographically important Taxa: <i>Blepharis nungarrinda</i> , <i>Euphorbia bergii</i> , <i>Panicum kalaharense</i> , <i>Helichrysum aretoides</i> , <i>Neritoidopsis keddiuensis</i> , <i>Lithops anomphie</i> subsp. <i>incognita</i> , <i>Trichanea naranthensis</i> subsp. <i>naranthensis</i> .
29.1 Road borrow pit	
33.4 BEC ERS saaging	
33.5 Beaconsfeld x-over	
34.6 BEC Electricity line for loco x-over	
Add 1 ERS saaging	
Add 1.1 Ronaldevlei possible borrow pit	
Add 1.2 Ronaldevlei possible borrow pit 2	
32 Postmansburg yard	
32.1 PMG Electricity this line	Biogeographically important Taxa: <i>Acacia laudertzei</i> var. <i>laudertzei</i> , <i>Ternstroemia serotina</i> , <i>Acacia haumanoxylon</i> , <i>Blepharis marginata</i> , <i>Pogonum polyphyllum</i> , <i>Cortesia prunaparvifolia</i> .
30 Houazel	Endemic Taxon: <i>Cataphyllium eugertianum</i> .
30.1 Borrow pits	Biogeographically important Taxa: <i>Acacia laudertzei</i> var. <i>laudertzei</i> , <i>Anthephorum argentea</i> , <i>Megastropacton albescens</i> , <i>Panicum kalaharense</i> , <i>Neritoidopsis bechuanensis</i> .
30.2 HZL The in of Hangle	
31 Mamathwane loops	
31.1 MHV	
31.3 Middelplais lake off	
Source Mucina & Rutherford (2006)	
Biogeographically important and endemic taxa identified during the survey included:	
Site 1.1 Barkley Bridge Borrow Pit- <i>Rhombohyllum rhomboidum</i>	
Site 30 Houazel- <i>Acacia haumanoxylon</i>	
Site 32.1 Houazel The in of Triangle- <i>Acacia haumanoxylon</i>	
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5.52.2 **Faunal Species**

The animals discussed in this section are prioritised because they are either threatened or are of conservation concern.

The best-known criteria for categorizing the level of threats facing species, is the IUCN's Red List criteria. According to Friedmann and Daly (2004), the IUCN Red List Categories are intended to be an easily and widely understood system for classifying species at high risk of global extinction. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. The IUCN categories are depicted below in Figure 5.52.2a, overleaf.

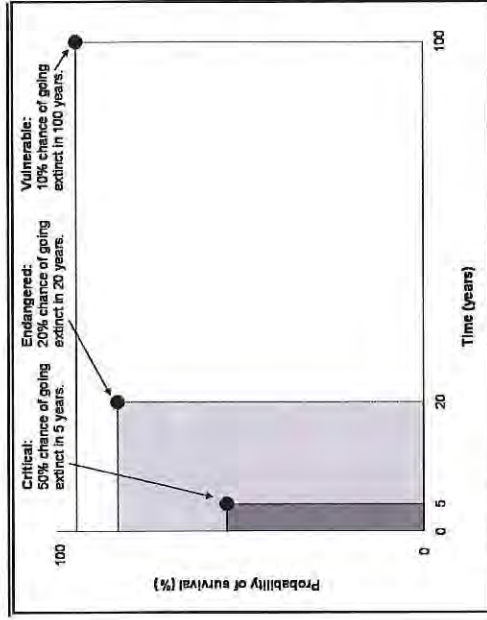
Figure 5.52.2a IUCN Red Data List Categories



Source: Friedmann and Daly (2004)

The severity of the "Threatened" categories (i.e. Critically Endangered (CR), Endangered (EN) and Vulnerable (VU)) should not be taken lightly. One criterion for determining the threatened category of a taxon is quantitative analysis, which is any form of analysis that estimates the extinction probability of a taxon based on known life history, habitat requirements, threats and any specified management options (illustrated in Figure 5.52.2b, overleaf).

Figure 5.52.2b Quantitative Analysis Showing the Probability of Survival in the Wild for CR, EN and VU species



Source: Barnes (2000)

On a National level, Atlases and Red Data Books for mammals, birds and frogs have been updated (Friedman & Daly, 2004; Barnes, 2000; Minter *et al.*, 2004), and the reptile Atlas is in the progress of being updated. These National listings follow the IUCN system for categorizing the conservation status of species. In addition to these National listings, in February 2007, the Minister of Environmental Affairs and Tourism published a list of CR, EN, VU and Protected Species (PS), according to Section 56(l) of the National Environmental Management: Biodiversity Act, 2004 (Act no. 10, 2004). A PS is classified as an indigenous species of high conservation value or national importance that requires national protection.

Working with Quarter Degree Squares

Quarter Degree Squares (QDS) correspond to the area shown on a 1:50 000 map and are approximately 27 km long (north-south) and 23 km wide (east-west) (Avian Demography Unit 2008).

Avifauna & Mammals

A broad avifauna and mammal assessment for QDS was achieved by using published data for species and using databases available on the internet. Table 5.52.2a identifies the Threatened (CR, EN & VU), Near Threatened (NT), PS and Data Deficient (DD) avifaunal and mammal species within the relevant QDS.

Table 5.52.2a The number of threatened (CR, EN & VU), NT and DD avifauna and mammal species that have been recorded throughout the 29 QDS, within which the various sites (loops, borrow pits, yards, etc.) are located.

QDS	SITES	AVIFAUNA					MAMMALS				
		VU	NT	CR	EN	VU	PS	NT	DD		
2722 BB	30 Hotazel; 30.2 HZL the in of triangle.	2	1	1		1	5	3	3		
2722 BD	31 Mamathwane loops; 31.3 Middelplaas take off.	2	1	1			4	3	3		
2722 DB	Emil substation	2	1	1			4	3	3		
2723 AC	31 Mamathwane loops; 31.3 Middelplaas take off.	1		1		1	5	3	3		
2823 AC	32 Postmasburg yard; 32.1 PMG electricity line.			1			4	5	3		
2824 DD	33 Konalsvlei & Beconsfield			1			8	3	4		
3024 CA	29 Bletternan; 29.1 Road borrow pit.	5	4	1			4	1	3		
3024 CD	28 Burger-villevog	4	6	1			4	1	4		
3024 DC	26 Linder; 27 Hanover Road; 27.2 Existing borrow pit	5	6	1			4	1	4		
3124 BA	25.2 Borrow pit near Wildfontein.	4	4	1	1		4	1	5		
3124 BB	24 Barredani; 25 Wildfontein; 25.1 Borrow pit near Wildfontein.	3	2	1	1		4	1	5		
3124 BD	23 Cation	1	4	1	1		4	1	6		
3125 AC	21 Rosanad; 22 Ronker	3	4	1	1		6	1	7		
3125 CA	20 Tafelberg	5	3	1	1		6	1	6		
3125 CB	18 Conway; 18.2 Conway possible borrow pit; 19 Glenheath.	5	5	1	1		6	1	6		
3125 CD	16.1 Borrow pit; 17 Vistvier	8	9	1	1	1	6	1	6		
3125 DC	16 Knustord; 16.2 Knustord borrow material.	7	5	1	1	1	6	1	6		
3225 BA	13 Halsoswan; 14 Matlow; 14.1 Marlow new borrow pit; 15 Kaptein.	7	5	1	2	2	7	3	6		
3225 BC	12 Moutner; 13 Halsoswan.	3	2	1	1	1	7	3	6		
3225 DA	11.1 Cutting as borrow pit	5	7	1	2	1	8	3	6		
3225 DB	10.1 Road borrow pit near Cookhouse; 10.2 Cookhouse possible borrow pit; 11 Klyfontein; 11.1 Cutting as borrow pit	6	8	1	2	1	8	3	6		
3225 DD	10 Golden Valley; 10.3 Golden Valley possible borrow pit.	2	3	1	2	1	7	3	7		
3325 BB	7 Birkhof; 8 Saltaire; 9 Komnadedg.	1	3	1	1	1	6	5	7		
3325 BC	3 Coerney	2	8	1	2	1	6	5	8		
3325 BD	7 Birkhof;	3	8	1	2	2	6	5	8		
3325 DA	1 Barkly Bridge; 1.1 Borrow pit	4	9	1	2	1	6	5	8		
3326 AA	7 Birkhof	5	6	1	1	2	6	5	7		

QDS	SITES	AVIFAUNA					MAMMALS				
		VU	NT	CR	EN	VU	PS	NT	DD		
3325 AC	4 Veeby; 5 Bagdes Craig; 6 Toebal.	3	3	1	2	2	6	5	8		

Source: Friedmann & Daly, 2004; South African Bird Atlas Project, 2007

Thirty four Red Data listed bird species have been recorded within the 28 QDS, which incorporate all the relevant sites (South African Bird Atlas Project, 2007). Of the 34 species recorded, 19 are NT and 15 are VU. During the field investigations the following Red Data birds were recorded: Blue Crane (*Anthropoides paradiseus*) (VU), Lammer Falcon (*Falco biarmicus*) (NT), Ludwig's Bustard (*Neotis ludwigi*) (VU), Lesser Kestrel (*Falco naumanni*) (VU). However, all of these birds were only observed foraging in the vicinity and not within the actual sites. In addition, the proposed construction activities (loop extensions, new loops, borrow pit usage, etc) are unlikely to cause any significant disturbance to these threatened and near threatened species.

Thirty four Red Data listed mammal species have been recorded within the relevant QDS (Friedmann & Daly, 2004). Of the 34 species recorded, 13 are DD, 7 are NT, 9 are VU, 3 are EN, and 2 are CR. During the field investigations Cape Fox (*Vulpes chama*) (PS) was recorded in the vicinity of the borrow pit close to Wildfontein and Hanover Road borrow pit, and South African Hedgehog (*Ailetris frontalis*) (NT) recorded in the vicinity of Hotazel and Mamathwane. The loss of habitat due to construction activities is unlikely to cause significant disturbance to these species or any other Red Data mammal species possibly occurring in the vicinity of the various sites.

For a complete list of Red Data avifaunal and mammal species recorded in the relevant QDS refer to Appendix D.

Herpetofauna

Red Data / Rare / Endemic / Restricted Species were identified to occur in the northern section (De Aar to Hotazel) and the southern section (De Aar to the Port of Ngqura) according to Prof. G. Alexander's (Herpetologist) expert opinion on datasets of Jacobsen (1989) and Mäner *et al.* (2004). For a complete list of reptiles likely to occur throughout the study area refer to Appendix E.

Table 5.52.2b Red Data/Rare/Endemic/Restricted Herpetofaunal Species Previously Recorded within some of the Study Sites

Common Name	Scientific Name	De Aar to Hotazel	De Aar to the Port of Ngqura	Conservation
Plain Mountain Adder	<i>Bitis hortulata</i>	Does not occur	Occurs in southern parts	Restricted and rare
Albany Adder	<i>Bitis albanica</i>	Does not occur	Occurs in southern extranes	Restricted and rare