APPENDIX 2

FAUNA

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SPECIALIST STUDY

THE POTENTIAL IMPACT OF THE

PROPOSED N2 WILD COAST TOLL HIGHWAY ON FAUNA

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FINAL REPORT

May 2008

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Background and brief

The South African National Roads Agency Limited (SANRAL) intends to develop a toll road on the N2 between the Gonubie Interchange near East London and the Isipingo Interchange south of Durban.

The key components of the proposed project include:

- Upgrading and widening of existing road sections (of the N2 and R61) included within the proposed project (approximately 470 km);
- New road construction within two greenfield sections (approximately 90 km);
- Construction of eight new major bridges;
- Upgrading and/or construction of new road interchanges and intersections; and
- Construction of associated structures (such as toll plazas, pedestrian overpasses and animal underpasses).

1.2 Terms of Reference

The objectives of this study were to provide an assessment of potential impacts on the fauna of the proposed N2 Wild Coast Toll Highway, including the proposed alignments and the "do nothing" alternative;

The assessment of impacts to be undertaken in accordance with the guidelines provided in the Guidelines Document: EIA Regulations (DEAT, 1998), the NEMA principles and Section 24(4) of NEMA (as amended).

1.3 Study area

The study area falls within sections of both Eastern Cape and KwaZulu-Natal provinces. It covers a total distance of approximately 560 km, from the N2 Gonubie Interchange near East London (Eastern Cape) to the N2 Isipingo Interchange south of Durban (KwaZulu-Natal). Existing roads, to be upgraded cover most of the route. A new highway will be constructed between Port St Johns and Port Edward (greenfields secion).

The route is considered in terms of seven sections, i.e.

Section 1: Gonubie Interchange to Ngobozi

Section 2: Ngobozi to Mthatha (Ngqeleni)

Section 3: Mthatha (Ngqeleni) to Ndwalane

Section 4: Ndwalane to Ntafufu River

Section 5: Ntafufu River to Lusikisiki (Magwa Intersection)

Section 6: Lusikisiki (Magwa Intersection) to Mthamvuna River

Section 7: Mthamvuna River to Isipingo Interchange

2. STUDY APPROACH

2.1 Site Visit

The proposed toll road route was inspected as part of a joint team from 19-22 June 2007.

2.2 Fauna

Assessment of faunal diversity in the region was based on existing knowledge. Due to the limitations of existing knowledge this report mainly discusses the terrestrial vertebrate fauna and selected invertebrate groups.

2.2.1 *Faunal Diversity*

Diversity of selected invertebrate fauna and the vertebrate fauna along the proposed route was determined by literature review. Additional faunal records for the region were derived from miscellaneous sources.

2.2.2 *Species of Special Concern*

Species of Special Concern (SSC), include:

- *Threatened species* listed in the Endangered or Vulnerable categories in the revised South African Red Data Books, or taxa described since the relevant SA RDB, or included in other international lists (e.g., 2007 IUCN Red List of Threatened Animals), or included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES);
- *Sensitive species* listed in the Rare, Indeterminate, or Monitoring categories of the SA Red Data Books, and/or birds listed in Globally Near Threatened (GNT), Nationally Threatened (NT) or Nationally Near Threatened (NNT) categories.
- *Endemic species* having 75% of their range in the Eastern Cape-KwaZulu-Natal region. Those species endemic to the Pondoland region were particularly highlighted.
- *NEMBA fauna* listed in the National Environmental Management: Biodiversity Act, 2004

- *Cultural Fauna* used in traditional healing and to prepare traditional medicines.

2.3 Identification of Risk Sources

Risk sources are defined as those factors that may result in the chance or possibility of loss or bad consequence to the faunal environment due to the proposed project. Risk sources potentially relevant to the fauna include:

Loss of sensitive faunal habitats	Loss of faunal diversity
Loss of species of special concern	Disruption to faunal movements
Impacts on Cape Griffon Vulture	Invasion by alien fauna
Increased fire risk	Chemical pollution
Increased noise and light pollution	Ecosystem disruption.

2.3.1 Risks during Construction Phase

A number of direct risks are associated with project actions such as construction camps, borrow pits, etc. These include:

Loss of sensitive faunal habitats	Loss of faunal diversity
Loss of species of special concern	

2.3.2 Risks during Operation Phase

Numerous risks are also associated with the operation of the proposed road, including:

Disruption to faunal movements	Impacts on Cape Griffon Vulture
Invasion by alien fauna	Increased fire risk
Chemical pollution	Increased noise and light pollution
Ecosystem disruption.	

2.4 Impact assessment

The assessment of impacts and theIr significance rating follows the methodology outlined in the FSR (Chapter 9.4 “Proposed impact rating methodology”).

3. DESCRIPTION OF AFFECTED ENVIRONMENT

The entire study area falls within the Maputaland-Pondoland-Albany Hotspot (MPA Hotspot). The distinctive flora of the Pondoland region is recognised as an important region of floral endemism. The regional fauna has not been as extensively studied and is not known to exhibit as many unique features. The area has been settled for many centuries, and the fauna is usually considered impoverished due to overgrazing and other man-induced impacts.

3.1 *Faunal Diversity*

Due to its extended length, faunal composition along the proposed road route shows regional differences. Due to the complexity and sheer numbers involved, no attempt is made to assess invertebrate faunal diversity in the region.

3.1.1 Amphibians

The Pondoland amphibian fauna is relatively poorly known. It includes approximately 31 species, but new taxa may well still exist.

The taxonomy of a number of species requires further resolution.

- Spiny reed frogs of the *Afrixalus knysna-spinifrons* complex - The assignment of former Transkei populations reamins problematic.
- Dainty frogs of the *Cacosternum boettgeri* complex - Undescribed taxa are known from grasslands in the former Transkei - KwaZulu-Natal border region, and cryptic taxa may occur in the Pondoland region.

3.1.2 Reptiles

Approximately 60 species of reptile are recorded or are likely to occur along the proposed route. The taxonomy of a number is problematic may include undescribed species, e.g.

- Common slug-eating snake (*Duberria lutrix*) – specimens from Port St Johns need further study as they may represent an undescribed species.
- Giant legless skink (*Acontias plumbeus*) - The southern population around East London is may represent a new species.
- A small snake collected from the Mbashe River Mouth (Broadley, pers. comm.) is currently unassignable to any other African snake and remains an enigma.
- Dwarf chameleons (*Bradypodion* sp.) - Isolated populations in forest and thicket habitats may include undescribed species. New species have been proposed from the Mkambati Nature Reserve, Mtamvuna Nature Reserve, and Oribi Gorge region, but their status remains unresolved.

3.1.3 Birds

The region has a rich avifauna, with nearly 500 species recorded. They include numerous sensitive and threatened species. Many Intra-African summer migrants also use the region both for breeding and in transit to more southerly areas.

3.1.4 Mammals

The area has a diverse mammal fauna with nearly 80 species recorded, comprising 11 insectivores, 19 bats, 3 primates, 2 lagomorphs, 19 rodents, 15 carnivores, antbear, 2 hyrax, bushpig, and 5-6 small antelope. However, many of the larger species are now locally extinct.

3.2 Species of Special Concern

3.2.1 Invertebrates

- Butterflies: Three rare butterflies from the Pondoland region are included in the South African Butterfly Red Data Book - the Pondoland Charaxes (*Charaxes pondoensis*), Southern Aslauga (*Aslauga australis*), and Bicolored Abantis (*Abantis bicolor*).
- Pulmonate Molluscs Two terrestrial slugs have been indicated as candidates for inclusion in the IUCN 'Red List' - *Chlamydephorus burnupi* (known from a single record from Port St. Johns) and *Chlamydephorus dimidius* (known from a single southern record from Mtamvuna Gorge).
- Cicadas These large, noisy insects show high levels of endemism. Two highly-localised species include *Stagira pondoensis* and *Nyara thanatotica*.
- Millipeds A new species was recently described (1998) from forest habitat in the Lusikisiki District.
- Archaeid spiders A small family of very rare spiders known from southern Africa, Madagascar and Australia. *Eriauchenius coronatus* is known from only two specimens and is endemic to the Vernon Crookes Nature Reserve. Two endemic species of *Afrarchaea* have been described from coastal Eastern Cape forest - *A. haddadi* (Komga, Kei Mouth) and *A. woodae* (Komga and Cwebe Nature Reserve).

3.2.2 Amphibians

Threatened species include:
Afrixalus spinifrons (Endangered), *Natalobatrachus bonebergi* (Endangered), and *Pyxicephalus adspersus* (Near Threatened).

Regional endemics include: Bush squeaker (*Arthroleptis wahlbergi*),Natal ghost frog (*Heleophryne natalensis*), Natal chirping frog (*Arthroleptella hewitti*), Forest tree frog (*Leptopelis natalensis*), Natal spiny reed frog (*Afrixalus spinifrons*), and Kloof frog (*Natalobatrachus bonebergi*).

Tropical species that reach their southern limit in the region include Long reed frog (*Hyperolius acuticeps*), Water lily frog (*Hyperolius pusillus*), Dwarf puddle frog (*Phrynobatrachus mababiensis*), Sharp-nosed grass frog (*Ptychadena oxyrhynchus*), and Striped grass frog (*Ptychadena porosissima*).

No amphibians along the route are of cultural significance.

3.2.3 Reptiles

A number of endemic species are candidates for inclusion in a SA RDB revision, including the Variable burrowing skink (*Acontias poecilus*) and Forest thread snake (*Leptotyphlops sylvicolus*).

3.2.4 Birds

A significant number of threatened (3 Endangered and 12 Vulnerable) and Near-Threatened (12) species occur along the proposed road route, as well as three sensitive species dependent upon forest habitat.

3.2.5 Mammals

With the local extinction of most of the large mammals, few mammals of conservation concern now survive in the region. Threatened mammals in the region include:

Oribi (*Ourebia ourebi*)	Endangered (Vulnerable).
Samango Monkey (*Cercopithecus mitis*)	Endangered (Rare).
White-tailed Rat (*Mystromys albicaudatus*)	Endangered (Vulnerable).
Giant golden mole (*Chrysospalax trevelyani*)	Vulnerable (Vulnerable).
Tree hyrax (*Dendrohyrax arboreus*)	Vulnerable (Rare).
Blue Duiker (*Philanthomba monticola*)	Vulnerable (Rare).
Honey badger (*Mellivora capensis*)	Near Threatened (Vulnerable).
Serval (*Felis serval*)	Near Threatened (Rare).

Two Endangered and six Near Threatened bats may also occur along the route.

4 IMPACT IDENTIFICATION AND DESCRIPTION

4.1 Introduction

Roads and their associated vehicle traffic may impact terrestrial fauna in diverse ways. The main impacts during construction involve the loss and fragmentation of habitats, with a consequent loss of biodiversity and possibly loss of species of special concern. During the operational life of the road, small cumulative impacts also occur, including ongoing road mortalities, increased disturbance (noise and light), dust generation, air pollution, chemical contamination from petroleum and rubber products, increased litter, change in the incidence of fire, and the introduction of alien vegetation.

4.2 Relevant legislation

A number of National Acts contain key legal considerations of importance to the proposed project. The applicable legislation includes:

National Environmental Management Act, Act No. 107 of 1998 (NEMA)

Environment Conservation Act No 73 of 1989 Amendment Notice No R1183 of 1997

National Forests Act (Act no 84 of 1998)

National Environmental Management: Biodiversity Act (Act No 10 of 2004)

Eastern Cape Environmental Conservation Bill, 2003

Eastern Cape Provincial Nature Conservation Ordinance (PCNO) 1974

4.3 Nature of Impacts

Potential impacts include:

Impact 1 – Loss of sensitive habitats

Impact 2 - Threats to biodiversity

Impact 3 – Threats to Species of Special Concern

Impact 4 - Impacts on the Cape Griffon Vulture

Impact 5 – Threats to Faunal Movements

Impact 6 – Invasion by alien fauna

Impact 7 – Increased fire risk

Impact 8 - Chemical Pollution

Impact 9 – Noise and Light Pollution

Impact 10 - Ecosystem disruption

5 ASSESSMENT OF IMPACTS ALONG THE ROUTE CORRIDOR

5.1 Description of Sections

Areas at the extremes of the route, e.g. East London to Kei (Section 1) and the KwaZulu-Natal south coast (Section 7) are relatively heavily populated, with areas of high urbanisation, diffuse suburban development, and private agricultural lands. The central section has moderate human densities and a long history of human occupation, and contains a number of 'greenfield' sections.

5.2 Sectional distribution of Impacts along route corridor

The extent, nature, and significance of these impacts in the different sections are summarised in the Impact Tables 5.1-5.7.

5.2.1 Impact 1 - Loss of sensitive habitats

Linear developments such as road routes bisect and thus increase the fragmentation of habitats. The distribution of sensitive habitats along the road route is not uniform, and most impact will occur during the construction phase in the two greenfield sections. Small wetlands, forests and rock outcrops occur along much of the length of these sections, and road and associated infrastructure construction will definitely impact these habitats. The greatest number of sensitive wetland habitats occurs along the Coastal Mzamba alternative route in Section 6.

Significant loss of forest/thicket habitat will occur along the line of the preferred route in section 4 (Ndwalane to Ntafufu River). Most forest habitat in the greenfield Section 6 (Lusikisiki (Magwa Intersection) to Mthamvuna River) are in river gorges and will not be directly affected by the preferred route. However, indirect effects mediated via changes in hydrodynamics of the adjacent wetlands, and direct effects resulting from increased human activity in the area are highly probable.

Major bridge crossings are required at five deeply incised gorges (Msikaba, Mtentu, Mnyameni, Mpahlane and Mzamba Rivers). There are extensive forest patches on the gorge slopes that must be avoided during construction.

Evaluation

For much of its route the proposed route will have no impact on conservation areas or other sensitive sites. Impacts on the two greenfield sections, crossing the Mzimvuba River near Port St. Johns (section 4) are highly probable and will be

negative and long-term. The significance may vary from low to high depending upon the local importance of the habitat and the particular fauna that it harbours.

5.2.2 Impact 2 - Loss of faunal diversity

The distribution of biodiversity along the sections of the proposed road route is summarised in Table 5.1. Highest levels of biodiversity occur in habitat mosaics, particularly in the coastal areas and river gorges.

Table 5.1 Faunal diversity along the route sections *

Group	Route Sections						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Amphibians	19	19	20	21	19	25	28
Reptiles	38	37	34	42	38	46	53
Mammals	45	38	38	50	38	48	48
Totals	**102**	**94**	**92**	**113**	**95**	**119**	**123**

* excluding birds and bats for which detailed numbers are poorly unknown

Evaluation

Due to previous land use impacts the central inland areas (through the former Transkei) have reduced biodiversity. High biodiversity occurs in association with forest, thicket and grassland habitats in the relatively pristine greenfield sections (4 and 6).

Negative impacts to biodiversity are highly probable and will occur over the long-term and the whole route. The severity and significance of the impact will be low in most sections, and medium in the greenfield sections which retain relatively high faunal diversity. These impacts cannot be effectively mitigated.

5.2.3 Impact 3 - Loss of species of special concern

The distribution of Species of Special Concern that occur along sections of the proposed road route are summarised in Table 5.2. The concentration of threatened species in the northern sections reflects the tropical-temperate transition that occurs along the route. The greatest concentration occurs in the greenfield section 4, where the proposed route passes through forest habitat.

Evaluation

Impacts during the construction of the proposed road (habitat loss and fragmentation) and its operation (increased fire, disturbance, road mortality, risk of pollution, etc) will

all pose a threat to the survival of populations of threatened species. All impacts will be negative. The significance of the impact is highest in the greenfield sections (4 – Medium; 6 – High) and depends on the regional or national conservation statusof the impacted species.

Table 5.2 Numbers of Species of Special Concern along the route sections

Group	Sections						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Butterflies	2		1	3	2	1	1
Slugs			1	1	1	1	1
Cicadas		1	1	3	1		
Millipedes					1		
Amphibians				2	1		
Reptiles		2	1	2	2	2	2
Birds	8	6	7	20	19	16	17
Mammals *	6	5	6	7	6	6	7
Totals	**16**	**14**	**17**	**38**	**32**	**26**	**28**

* excluding bats

5.2.4 Impact 4 - Impacts on Cape Griffon Vulture

Concern has been expressed by IAPs of specific impacts on the Cape griffon Vulture. It is endemic to southern Africa, has the smallest distribution of any Old World vulture and is currently categorized as Vulnerable (South Africa and globally) and listed as Endangered on the NEMBA list. The world population has dropped to less than 3000 pairs. Important vulture breeding sites in the region of the toll highway have declined or have been abandoned (e.g. Mtentu River colony). The breeding colony on the cliffs of the Msikaba Gorge, downstream from the proposed bridge site, is considered of high priority.

Evaluation

The Msikaba vulture breeding colony lies downstream from the bridge site which is not directly visible from the breeding cliffs. Construction of the proposed bridge across the Msikaba gorge will negatively impact the adjacent Cape Griffon Vulture breeding colony. The impact will be Regional and of medium-high intensity in the long-term. It will result in an impact of High significance. Current levels of protection for vultures in the region are inadequate and illegal exploitation of vultures in the region are likely to continue with the 'Do-nothing' alternative.

Mitigation involves:

- Avoiding disturbance to the breeding colony. All air and road traffic associated with the planning, construction and operation of the toll road, particularly the massive engineering involved in the construction of the Msikaba River bridge, must observe the maximum possible exclusion zone around the Msikaba vulture colony. Helicopter and fixed-wing flights down the Msikaba River from the bridge site should be banned, or maintain a minimum height of 1000m (normal limit over conserved areas) in the region.
- Access to breeding ledges by humans (other than qualified researchers undertaking registered research) and feral dogs must be prohibited.
- Raptor and vulture mortalities are often associated with power transmission lines. All cables across the major river gorges in greenfield sections, either associated with either power transmission or during bridge construction, must have suitable bird diverters (BDs) installed to prevent bird collisions. A variety of structures have been designed to increase the visibility of powerlines in high-sensitive regions (Ledger 1994; Van Rooyen 1992, Van Rooyen & Ledger 1999), but the most suitable type and spacing of BDs should be determined in consultation with specialists. The impact of powerlines and cables across the major gorges on bird mortality needs to be regularly monitored. Dead or injured birds discovered below the bridge points should be identified and recorded. Results should be collated and forwarded to the Vulture Study Group (see Boshoff & Anderson 2006; Piper 2007 for details).
- No borrow pits or associated construction projects should occur in this exclusion zone.
- Blasting operations should be restricted to daylight periods, and should avoid the egg-laying season (March-July).
- Additional mitigation, to off-set the loss of carcasses (associated with reduced livestock mortalities from the fenced road) and foraging habitat, may require supplementary feeding with vulture restaurants. This, and any other ecotourism ventures involving vultures that are associated with the toll road, must include expert input from the Vulture Study Group (see Boshoff & Anderson 2006; Piper 2007 for details).

These mitigatory measures could reduce the impact to medium significance.

5.2.5 Impact 5 - Disruption to animal movements

Impacts on animal movements arise directly, via increased mortalities from road traffic, and also indirectly from disturbance and behavioural reluctance to cross alien habitat. The most sensitive sections of road include the major river crossings, and forest patches of the greenfield sections.

Evaluation

The impact will be negative, localised and occur over the long-term. The intensity and significance of the impact will be low in most sections, but medium in the greenfield sections containing sensitive habitats such as forest fragments, wetlands and vulture colonies.

Mitigation depends on:

- Monitoring the numbers of road mortalities and disturbance to migratory species and those that cover wide areas in their normal foraging (e.g. vultures). Where breeding toads are being killed in unacceptable numbers, under-road culverts have been effectively installed in a number of European sites to allow their movement across road barriers (Langton, 1989; Yanes et al., 1995).
- Ensuring that vegetation levels in the road reserve are maintained at low heights;
- That associated power and telephone lines are installed at the extreme edge of the road reserve and incorporate bird deflectors where they cross major river gorges.

5.2.6 Impact 6 - Invasion by alien fauna

Alien fauna, particularly birds (e.g. feral pigeons, house sparrow, starlings and Indian myna) and introduced rodents (House mouse and Norwegian rat) are known from throughout the region. Feral pets (cats and dogs) are widespread, even in the greenfield sections, where poorly controlled livestock movements are also common. All secions are equally susceptible to further alien fauna introductions.

Evaluation

The whole proposed route and alternatives have already been impacted by alien fauna introductions. No provincial or national control or eradication plans for the existing alien fauna are in place. Further negative impacts due to the invasion of

alien fauna to the region are highly probable. They will initially be localised, but will spread and occur over the long-term. The significance of additional invasion resulting from the project will be low as it is already underway from existing populations in urban centres throughout the route. Control by road authorities is impracticable. Pathogen transmission from alien fauna, particularly rodents, is a potential, but currently low, health risk. The impact severity and significance is low and will probably remain low in the longterm.

5.2.7 Impact 7 - Increased fire risk

Increased fire risk is a negative impact that will definitely occur along the whole route. The greatest impact will occur where fire can extend into sensitive habitats, e.g. in the greenfield sections and into protected areas.

Evaluation

The impact will be localised and will occur over the long-term and can affect local ecosystems and threatened species. Fauna associated with forest and wetland habitats can be expected to be most at risk.

Mitigation measures include:

- Regular maintenance of the road reserve should ensure that vegetation is cut short so that it serves as an effective fire breaks, particularly where the road runs through, or adjacent to sensitive habitats such as indigenous forest/thicket and wetlands.
- Due to increased fire risk from broken bottles, cigarettes, etc., rest stops and other road associated structures should not be situated adjacent to sensitive habitats (forests or wetlands).

5.2.8 Impact 8 - Chemical pollution

Negative impacts from chemical pollution will definitely occur along the whole road route, and with little change in severity between the different sections. Pollution can, however, be expected to be greater at road interchanges and toll plazas, and along sections with the highest vehicle traffic flows (e.g. section 7).

Evaluation

All impacts will be localised and will occur over the long-term. The intensity and significance of the impact will be low. Mitigation involves:

- The use of herbicides for the control of all plant growth in the road reserve and toll plazas should be very restricted and strictly controlled. Mechanical methods of plant growth control are preferred.
- Road associated structures, e.g. toll plazas, interchanges, garages and shopping centres, etc., should not be situated adjacent to sensitive habitats such as wetlands and forest patches.
- Storm water outlets, particularly from toll plazas, should not drain into natural wetlands.

5.2.9 Impact 9 - Noise and light pollution

Increased noise and light pollution asociated with vehicle traffic will occur throughout the route. The greatest levels, but not necessarily impacts, will occur in association with highest traffic levels, e.g. section 7. The intensity and faunal significance of the impact will be greatest in the greenfield sections.

Evaluation

Faunal disturbance will definitely occur due to noise and light pollution associated with construction (particularly of the major bridges in the greenfields sections) and road traffic levels during the operational phase. The main mitigation involves the primary siting of road lighting and toll plazas. These should not be placed next to sensitive habitats, i.e. wetlands, forests and vulture breeding/roosting cliffs. The main significance of the impact will occur in the greenfield sections, and will be Medium and cannot be mitigated during the operational phase.

5.2.10 Impact 10 - Ecosystem disruption

Two sections of the proposed route in the greenfields section impact on sensitive habitats. In the south-west the preferred route passes through a large area of intact forest/thicket habitat to the west of the Mzimvubu River (section 4), whilst in the other greenfield section (6) the preferred route will pass through wetland areas and over numerous river gorges.

Evaluation

This will result in sensitive habitat loss and fragmentation, causing a local, long-term impact of high probability and medium intensity and significance. In Section 4 the alternate route (1b) has the significant advantage of avoiding this area and thus reducing faunal impacts over the preferred alignment. Such mitigation will reduce

this ecosystem impact to one of low significance. In the north-east an alternate route (the Coastal Mzamba alternative) passes through a large area with isolated wetlands associated with drainage lines of the northern tributaries of the Mnyameni River. This option will result in sensitive habitat loss and fragmentation, causing a local, long-term impact of medium intensity and significance. The preferred route has the significant advantage of avoiding this area and thus reducing faunal impacts. It will reduce this ecosystem impact to one of low significance.

5.3 Summary of Impacts along the Sections of the Route Corridor.

The Phase, Extent, Duration, Intensity, Probability, Confidence, and Significance (with and with out Mitigation) of the various Impacts along the sections of the route corridor are summarised in Tables 5.3-5.9.

Faunal impacts will be greatest in the greenfield sections 4 and 6 (Tables 5.6 and 5.8). The greatest impacts will include the loss of sensitive habitats in the Ndwalane to Ntafufu section (4), and the probable loss of Species of Special Concern, particularly the Endangered Cape Griffon Vulture in the Lusikisiki to Mthamvuna River section (6). If the proposed route through Section 4 is undertaken then loss of Sensitive habitat cannot be mitigated and remains of High significance. The impact on species of special concern, particularly the Cape Griffon Vulture, in Section 6 can be mitigated by ensuring that the Msikaba River vulture colony, which is of Regional and National importance, is undisturbed.

Table 5.3 Assessment of negative impacts associated with the proposed N2 Toll Road route – Section 1. Gonubie Interchange to Ngobozi

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.4 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 2. Ngobozi to Mthatha (Ngqeleni)

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.5 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 3. Mthatha to Ndwalane

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.6 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 4. Ndwalane to Ntafufu River

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	High	definite	HIGH	HIGH	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
3 Loss of SSCs	Construction	local	short term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

Table 5.7 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 5. Ntafufu River to Lusikisiki (Magwa Intersection)

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

Table 5.8 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 6. Lusikisiki to Mthamvuna River

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Medium	definite	MEDIUM	LOW	High
	Operation	local	permanent	Medium (Low)	probable	MEDIUM	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
3 Loss of SSCs	Construction	local	short term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
4 Cape Griffon Vulture	Construction	R/N	short-term	Medium (Low)	probable	MEDIUM **	LOW	Medium
	Operation	R/N	long-term	High (Medium)	probable	HIGH	MEDIUM	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
8 Chemical Pollution	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
9 Noise and Light Pollution	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
10 Ecosystem disruption	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

** Although the construction period occurs in the short term the impact can be more significant (long-term, even permanent) if the vulture breeding colony is deserted because of disturbance during this phase

Table 5.9 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 7. Mthamvuna River to Isipingo Interchange

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

6 ASSESSMENT OF ALTERNATIVES

6.2 THE "DO NOTHING" ALTERNATIVE

The "do nothing" alternative means that the existing threats to regional biodiversity will continue. Faunal diversity in general, and for Cape Griffon Vulture in particular, is significantly impoverished. These impacts result from existing cultural practises, e.g. from the 'muti' trade, or from the lack of socio-economic development of the rural communities. Without alternative land use strategies the existing environmental impacts will almost certainly intensify with continued negative faunal impacts.

6.3 ALTERNATIVE ROUTE ALIGNMENTS

1b A major re-alignment that involves a detour from the preferred route to cross the Mzimvubu River on a new bridge alignment.

Evaluation The alternate route has the significant advantage of avoiding the large areas of intact thicket habitat west of the Mzimvubu River that is destroyed during construction of the preferred route. The alternate offers significant advantage in reducing faunal impacts over the preferred alignment.

2a A small re-alignment that follows more closely an existing track.

Evaluation The alternative has no advantages in reducing faunal impacts.

5g A small re-alignment that traverses extensive exposed bedrock of the Msikaba Sandstone formation and also the headwaters of a number of small tributaries draining into the Msikaba River.

5e A major re-alignment that in the west departs from the preferred alignment and passes close to the exceptionally scenic Mteku waterfall, where it requires a high bridge to cross the river, significant in-fill and loss of forest patches immediately to the east of the bridge, as well as another significant bridge across the Msikaba River and a route along the eastern rim of the gorge.

Evaluation The alternate routes potentially cause greater faunal impact, including disturbance to Lanner falcon nests on the cliffs at the Mteku waterfall (5e), loss of sensitive forest habitat (5e) and plants associated with the Msikaba sandstone formation (5g), as well as greater danger of erosion along the western (5g) and eastern (5e) rim of the Msikaba gorge. They offer no advantages over the preferred alignment.

9d-5 A major re-alignment that requires the construction of a major bridge across the Mtentu River. This route passes closer to a significant Cape Griffon Vulture colony than the preferred route. It also crosses large amounts of cultivated land and a large tributary of the Mtentu that may require an additional bridge, or significant road support.

Evaluation The alternate route potentially causes greater faunal impact, particularly to the Cape Griffon Vulture colony, and offers no advantage over the preferred alignment.

10a A major re-alignment that requires the construction of only one bridge across the Mnyameni River, and none across the Kulumbe River. However, at its eastern end the route crosses the head waters of three minor drainage lines of the Mnyameni river, before crossing the river just upstream from the Mnyameni Waterfall.
10e A variant of alignment 19a that requires two bridges (across the Mnyameni and Kulumbe rivers), but is further upstream from the Mnyameni waterfall.

Evaluation The alternate alignments do not pass through significant amounts of sensitive habitat (wetland or forest). However, there is little faunal advantage in changing the preferred alignment.

Coastal Mzamba route

This major re-alignment north of the preferred alignment from just west of the Mzamba River and rejoins it just before the bridge crossing on the Mzentu River. It avoids a road bridge across the Mnyameni River (alternatives 10a, 10c and 10e above) but transects large wetlands in the drainage lines (at least 8) of the northern tributaries of the Mnyameni River.

Evaluation The alternate alignment passes through significant amounts of sensitive wetland habitat (Figs. 6.1-2), with the direct loss of habitat for endangered species and for threatened wetland-associated birds. There is also a danger of increased erosion and run-off into the Mnyameni River. Both alignments cause significant negative faunal impacts, but the preferred alignment avoids the most sensitive habitats.

6.4 ALTERNATIVE TOLL PLAZA LOCATIONS

Alternative mainline toll plaza locations have been identified for mainline toll plaza locations. All alternatives in all sections have small footprints that do not significantly fall outside the road reserve. In addition all sites are located away from sensitive habitats and all faunal impacts for all toll plaza locations are considered of Low Significance.

7. DISCUSSION

Faunal diversity along much of the route has already been significantly impacted, particularly by the long history of land use. The “do nothing” alternative will not help the continued decline and impoverishment of faunal diversity in the region.

Construction and operation of the the proposed toll road will have diverse environmental impacts on faunal diversity in the region. Existing road corridors have existed for many years over much of the proposed toll highway route, and the greenfield sections (90km) represent only 16.4% of the total route. Environmental impacts over most of the route will therefore be of low intensity, negative, local and longterm, and of low significance.

Impacts of highest significance would occur in both greenfield sections, particularly in the extended route through the Pondoland Centre of Endemism. The greatest impacts will include the loss of sensitive habitats in the Ndwalane to Ntafufu section (4), and the probable loss of Species of Special Concern, particularly the Endangered Cape Griffon Vulture in the Lusikisiki to Mthamvuna River section (6). If the proposed route through Section 4 is undertaken then loss of Sensitive habitat cannot be mitigated and remains of High significance. The impact on species of special concern, particularly the Cape Griffon Vulture, in Section 6 can be mitigated by ensuring that the Msikaba River vulture colony, which is of Regional and National importance, is undisturbed.

Impacts on Species of Special Concern is best mediated by avoiding and protecting Sensitive Habitats, particularly wetlands, forest patches and vulture cliff roosts and breeding sites in the Msikaba River gorge. The state of these habitats should be carefully monitored during the construction and operation of the toll road.

TABLE OF CONTENTS

DECLARATION OF CONSULTANT'S INDEPENDENCE

Prof. W. R. Branch is an independent consultant to CCA Environmental (Pty) Ltd, and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work.

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As an independent consultant W. R Branch has undertaken faunal surveys for environmental impact assessments since 1997. Significant impact projects include: Escom (1989), proposed Nuclear Reactor Site, Oyster Bay; Mondi Forests (1991). North East Cape Afforestation Project; Institute for Coastal Research (1997) EIA, St George's Strand hotel development; Coastal and Environmental Services (CES) (1996). EIA Gencor-Kynok Zinc and Phosphoric acid project, West Bank, East London; CES (1996). SEA Coega Industrial Development Zone; CES (1997) Genbique Moebase-Lipobane, Northern Mozambique, mining concession; NSR Environmental Consultants (Australia) (1998) Cuango River, Northern Angola, diamond mining concession; CES (1998). BHP Moma, Northern Mozambique, mining concession; Conservation International (2002) RAP, Herpetofaunal survey of Haute Dodo and Cavall Forest Rserves, Cote d'Ivoire; Arcus-Gibb (2005), Amatole Integrated Coastal Management Plan, Terrestrial Fauna; CES (2005) Tiomin Resettlement, Kenya; CES (2005); Madiba Bay Leisure Park EIA, Terrestrial Fauna: Specialist Report; CES (2006). Environmental Impact Assessment: Tulear Sands Mine, South-western Madagascar; Terrestrial Fauna, Specialist Report; etc.

He has published over 175 scientific articles in peer-reviewed journals, 18 books and chapters, and over 50 Environmental impact assessment reports. He has undertaken faunal surveys for diverse organisations (Conservation Interational, Mt Mulanje Conservation Trust, USAid, Fauna and Flora Prservation Society, etc) in over 15 African countries including Cote d'Ivoire, Madagascar, Gabon, Angola, DRC, Kenya, Mozambique, etc.

1968	B.Sc. (Hons) Zoology, Univ. Southampton, UK
1971	PhD., Univ. Southampton, UK
1991-1994	Board of Directors, IUCN SSC Declining Amphibian Task Group
1997-2000	Chair, IUCN SSC African Reptile and Amphibian Group
2001-2003	Chair, IUCN SSC African Reptile Group, 2001-2003
2007	Honorary Research Professor, University of the Witwatersrand
2007	NRF Evaluation B2

1. INTRODUCTION

1.1 Background and brief

The South African National Roads Agency Limited (SANRAL) intends to develop a toll road on the N2 between the Gonubie Interchange near East London and the Isipingo Interchange south of Durban. In accordance with national legislation, SANRAL has appointed CCA Environmental (CCA) to undertake an Environmental Impact Assessment (EIA) of the proposed project.

The proposed N2 Wild Coast Toll Highway extends over a total distance of approximately 560 km between the N2 Gonubie Interchange (near East London in the Eastern Cape) and the N2 Isipingo Interchange (south of Durban in KwaZulu-Natal). It is proposed that the design, construction, financing, operation and maintenance of the proposed highway be undertaken as part of a 30-year Concession Contract.

The key components of the proposed project include:

- Upgrading and widening of existing road sections (of the N2 and R61) included within the proposed project (approximately 470 km);
- New road construction within two greenfield sections (approximately 90 km);
- Construction of eight new major bridges;
- Upgrading and/or construction of new road interchanges and intersections; and
- Construction of associated structures (such as toll plazas, pedestrian overpasses and animal underpasses).

During the Scoping phase of the Environmental Impact Assessment (EIA) for the proposed N2 Wild Coast Toll Highway a number of issues and concerns requiring further investigation were identified. These included the assessment of potential impacts of the proposed project and identified feasible alternatives on the fauna. William R. Branch was commissioned to undertake a detailed investigation and assessment of the potential impacts of the proposed N2 Wild Coast Toll Highway on the fauna. This information is to be used in the further planning and design of the proposed project and would be included in the Environmental Impact Report to be compiled as part of the EIA process.

The findings of the study are based on a site visit in June 2007, and incorporates information presented in the specialist faunal study undertaken during the previous EIA process. The objectives of this study were to provide an assessment of potential impacts on the fauna of the proposed N2 Wild Coast Toll Highway.

This report comprises the faunal assessment of the study area for the EIA study and serves to assist in assessing potential impacts of the proposed route.

1.2 Terms of Reference

The contractually-defined objectives of this study were to provide an assessment of potential impacts on the fauna of the proposed N2 Wild Coast Toll Highway. The alignments to be investigated and assessed in detail are as follows:

1. The “do nothing” alternative;
2. SANRAL’s preferred alignment between Lusikisiki and the Mthamvuna River;
3. Site-specific alternative route alignments in the greenfields sections of the proposed project, i.e. in the sections between Ndwalane and Ntafufu and between Lusikisiki and the Mthamvuna River:
    a. for the proposed alignment between Ndwalane and the Mzimvubu River;
    b. for the proposed alignment in the vicinity of Ntafufu village and the Ntafufu River;
    c. for the proposed alignment of the approach to the Msikaba bridge crossing site;
    d. for the proposed alignment across the Mthentu River; and
    e. for the proposed alignment across the Mnyameni River.
4. The Coastal Mzamba route between Lusikisiki and the Mthamvuna River; and
5. Alternative mainline toll plaza positions to SANRAL’s preferred Ndwalane and Mthentu mainline toll plazas.

The assessment of impacts will broadly be undertaken in accordance with the guidelines provided in the Guidelines Document: EIA Regulations (DEAT, 1998), the NEMA principles and Section 24(4) of NEMA (as amended). The following General Terms of Reference were to be conformed to for the specialist study:

- Describe the baseline conditions that exist in the study area and identify any sensitive areas that would need special consideration;
- Ensure that all issues and concerns (in Chapter 7 of the Scoping Report) and potential environmental impacts (in Chapter 8 of the Scoping Report) relevant to the specific specialist study are addressed and recommend the inclusion of

any additional issues required in the Terms of Reference, based on professional expertise and experience. Also consider comments on the previous specialist study as per the review of the previous EIA process, appeals and RoD commissioned by the Minister of Environmental Affairs and Tourism (final report dated 29 October 2004), as appropriate;

- Provide a brief outline of the approach used in the study. Assumptions, sources of information and the difficulties with predictive models must also be clearly stated;
- Indicate the reliability of information used in the assessment, as well as any constraints/limitations applicable to the report (e.g. any areas of insufficient information or uncertainty);
- Identify the potential sources of risk to the affected environment during the construction and operational phases of the proposed project;
- Identify and list relevant legislative and permit requirements applicable to the potential impacts of the proposed project; and identified feasible alternatives;
- Include an assessment of the “do nothing” alternative
- Assess and evaluate potential direct and indirect impacts during both the construction and operational phase of the proposed project;
- Identify and assess any cumulative effects arising from the proposed project;
- Undertake field surveys, as appropriate to the requirements of the particular specialist study;
- Identify areas where impacts could combine or interact with impacts likely to be covered by other specialists, resulting in aggravated or enhanced impacts and assess potential effects;
- Apply the precautionary principle in the assessment of impacts, in particular where there is major uncertainty, low levels of confidence in predictions and poor data or information;
- Determine the significance of assessed impacts according to a Convention for Assigning Significance Ratings to Impacts;
- Recommend practicable mitigation measures to minimise or eliminate negative impacts, enhance potential project benefits or to protect public and individual rights to compensation and indicate how these can be implemented in the final design, construction and operation of the proposed project;
- Provide a revised significance rating of assessed impacts after the implementation of mitigation measures;

- Identify ways to ensure that recommended mitigation measures would be implemented, as appropriate; and
- Recommend an appropriate monitoring and review programme in order to track the effectiveness of proposed mitigation measures.

The Specific terms of reference for the Faunal study were as follows:

- Assess the potential impact of the proposed bridges on the breeding grounds of birds of prey such as eagles, vultures and owls; and
- Evaluate the ecological sustainability of the proposed project and identified feasible alternatives (in association with other relevant studies).

1.3 Study area

At a regional level the study area falls within sections of both Eastern Cape and KwaZulu-Natal provinces and would extend over a total distance of approximately 560 km, from the N2 Gonubie Interchange near East London (Eastern Cape) to the N2 Isipingo Interchange south of Durban (KwaZulu-Natal). For most of this area there is an existing road and only upgrades of this road are expected to take place. The area within which greenfields construction is proposed to take place occurs between Port St Johns and Port Edward. The route is considered in terms of seven sections, i.e.

Section 1: Gonubie Interchange to Ngobozi
Section 2: Ngobozi to Mthatha (Ngqeleni)
Section 3: Mthatha (Ngqeleni) to Ndwalane
Section 4: Ndwalane to Ntafufu River
Section 5: Ntafufu River to Lusikisiki (Magwa Intersection)
Section 6: Lusikisiki (Magwa Intersection) to Mthamvuna River
Section 7: Mthamvuna River to Isipingo Interchange

These sections pass through different habitats subject to different land uses, and which will involve different project actions.

2. STUDY APPROACH

This section describes the approach used for the study, the information base and any assumptions and limitations.

2.1 Site Visit

The proposed toll road route was inspected as part of a joint team, 19-22 June 2007. The trip started from Durban, and involved brief stops to investigate the proposed projects, including: the Adams Road interchange; the toll plaza site at Park Rynie; the Southbroom and Port Edward interchanges; the Coastal Mzamba alignment; the proposed crossing of the Mzamba gorge, the Mnyameni River, and the Mtentu gorge; view the Msikaba valley and proposed alignment; view the Msikaba waterfall and by helicopter view the preferred alignment between Msikaba and R61 and also the Coastal Mzamba alignment; view the crossing of the Mzimvubu at Ntile Nek and the alignment through Ntafufu; to Ndwalane to view the proposed toll plaza site; view the crossing point of Mzimvubu River; view alternative toll plaza positions on the R61; and view toll plazas at Candu and Ngobozi and the proposed new interchanges on the N2.

2.2 Fauna

Assessment of faunal diversity in the region is based on existing knowledge. Due to the limitations of existing knowledge this report mainly discusses the terrestrial vertebrate fauna and selected invertebrate groups. Fish are covered in the Aquatic Ecosystems report

2.2.1 ***Faunal Diversity*** The known diversity of selected invertebrate fauna and the vertebrate fauna along the proposed route was determined by literature review. Species known from the region, or from adjacent regions whose preferred habitat(s) are known to occur within the highway route, were also included. Literature sources included:

- *Invertebrates* – Odonata, Tarboton and Tarboton (2002, 2005); Onychophora, Hamer et al. (1997); Pulmonata, Herbert (1997); Lepidoptera, Migdoll (1987); Cicadidae, Villet (1997a,b); Araneae, Lotz (2007).
- *Amphibians* – Poynton (1990), Pickersgill (1996, 2005), Channing (2001), Minter *et al* (2004).
- *Reptiles* – Hewitt (1937), Branch (1998), Raw (1995, 2001).
- *Birds* – Quickelberge (1989), Barnes (1998), Harrison *et. al* (1997).

- *Mammals* - Skead (1987), Taylor (1998), Fieldmann and Daly (2004), Skinner and Chimimba (2005).

Additional faunal records for the region were derived from miscellaneous sources, e.g. Abbott (2006). The assessment of the surviving large mammal fauna along the route draws from White (1999).

2.2.2 ***Species of Special Concern*** Compiled faunal checklists were reviewed for the presence of Species of Special Concern (SSC), including:

- *Threatened species*, defined as: a) species listed in the Endangered or Vulnerable categories in the revised South African Red Data Books (SA RDB - birds, Barnes, 2000; herpetofauna, Branch 1988, Minter et al. 2004; terrestrial mammals, Smithers 1986, Fieldmann and Daly 2004; butterflies, Henning and Henning, 1989) or listed in the Globally Threatened (GT) category of *Important Bird Areas of Southern Africa* (Barnes 1998); b) species of special conservation concern (i.e. taxa described since the relevant SA RDB, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists (e.g., 2007 IUCN Red List of Threatened Animals); d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES);
- *Sensitive species*, defined here as those species listed in the Rare, Indeterminate, or Monitoring categories of the SA Red Data Books, and/or species listed in Globally Near Threatened (GNT), Nationally Threatened (NT) or Nationally Near Threatened (NNT) categories of *Important Bird Areas of Southern Africa* (Barnes 1998).
- *Endemic species*, defined as those having 75% of their range occurring in the Eastern Cape-KwaZulu-Natal region. Those species endemic to the Pondoland region were particularly highlighted.
- *NEMBA fauna* listed in the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species (DEAT 2007); and
- *Cultural Fauna* that are used in traditional healing and to prepare traditional medicines (Simelane 1996) and that may be threatened by unsustainable exploitation.

2.3 Identification of Risk Sources

Risk sources are defined as those factors that may result in the chance or possibility of loss or bad consequence to the faunal environment due to the proposed project. Together project actions (direct or indirect) cause sources of risks that impact on the fauna in various ways. The proposed development consists of a construction and an operation phase. Both phases generate potential risks to the faunal environment along the proposed route corridor as well as beyond.

There is an extensive literature that reviews possible risks associated with construction of a road through a previously untransformed landscape (see Spellergerb and Morrison, 1998, and references therein). Together the various risk sources result in a number of impacts that are potentially relevant to the fauna. These include the following:

Loss of sensitive faunal habitats
Loss of faunal diversity
Loss of species of special concern
Disruption to faunal movements
Impacts on Cape Griffon Vulture
Invasion by alien fauna
Increased fire risk
Chemical pollution
Increased noise and light pollution
Ecosystem disruption.

The importance of these different impacts during the construction and operation phases are first identified, and then their nature discussed more fully.

2.3.1 Risks during Construction Phase

A number of direct risks to the fauna would result from construction activities along the proposed route corridor and with associated project actions, e.g. construction camps, borrow pits, etc. These include:

Loss of sensitive faunal habitats
Loss of faunal diversity
Loss of species of special concern

Indirect and cumulative impacts:

Many risks are indirect and may be associated with better accessibility of the region, resulting in strip development, and higher rates of harvesting of fauna, particularly rare species. Many risks also become cumalative leading to the loss or reduction in resilience/stability of ecosystems due to risks such as habitat fragmentation, importation of alien species, loss of biodiversity, disruption of biological interactions leading to a loss or change of ecosystem function (e.g. nutrient cycling, hydrological cycling, pollination, carbon sequestration), etc.

2.3.2 Risks during Operation Phase

Numerous risks are also associated with the operation of the proposed road, including:

Disruption to faunal movements

Impacts on Cape Griffon Vulture

Invasion by alien fauna

Increased fire risk

Chemical pollution

Increased noise and light pollution

Ecosystem disruption.

2.4 Impact assessment

The assessment of impacts and theIr significance rating follows the methodology outlined in the FSR (Chapter 9.4 “Proposed impact rating methodology”).

2.4.1 Rating of Impacts

The criteria for rating impacts are given in Table 4.2, and conventions for assessing the significance of impacts are detailed in Table 4.3.

Table 2.1 Impact assessment criteria and rating scales

CRITERIA	RATING SCALES
Intensity (The expected magnitude or size of the impact)	• Negligible • Low - where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected • Medium - where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected • High - where natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected
Extent (The predicted scale of the impact)	• Site-specific • Local (immediate surrounding areas) • Regional (Eastern Cape or KwaZulu-Natal) • National
Duration (The predicted lifetime of the impact)	• Short-term (0 to 5 years) • Medium term (6 to 15 years) • Long term (16 to 30 years) - where the impact will cease after the operational life of the activity either because of natural processes or by human intervention • Permanent - where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient
Probability (The likelihood of the impact occurring)	• Improbable – where the possibility of the impact materialising is very low • Probable – where there is a good possibility (<50% chance) that the impact will occur • Highly probable – where it is most likely (50-90% chance) that the impact will occur • Definite – where the impact will occur regardless of any prevention measures (>90% chance of occurring)
Status of the impact	Here it is stated whether the impact is positive (a “benefit”), negative (a “cost”) or neutral
Degree of confidence (The specialist’s degree of confidence in the predictions and/or the information on which it is based)	• Low • Medium • High

Table 2.2 Convention for assigning significance ratings

SIGNIFICANCE RATING	**DESCRIPTION (in terms of intensity, extent and duration)**
VERY HIGH ***Significance***	Impacts could be: EITHER of **high intensity** at a **regional level** and endure in the **long term**; OR of **high intensity** at a **national level** in the **medium term**; OR of **medium intensity** at a **national level** in the **long term.**
HIGH Significance	Impacts could be: EITHER of **high intensity** at a **regional level** and endure in the **medium term**; OR of **high intensity** at a **national level** in the **short term**; OR of **medium intensity** at a **national level** in the **medium term**; OR of **low intensity** at a **national level** in the **long term**; OR of **high intensity** at a **local level** in the **long term**; OR of **medium intensity** at a **regional level** in the **long term.**
MEDIUM Significance	Impacts could be: EITHER of **high intensity** at a **local level** and endure in the **medium term**; OR of **medium intensity** at a **regional level** in the **medium term**; OR of **high intensity** at a **regional level** in the **short term**; OR of **medium intensity** at a **national level** in the **short term**; OR of **medium intensity** at a **local level** in the **long term**; OR of **low intensity** at a **national level** in the **medium term**; OR of **low intensity** at a **regional level** in the **long term.**
LOW Significance	Impacts could be: EITHER of **low intensity** at a **regional level** and endure in the **medium term**; OR of **low intensity** at a **national level** in the **short term**; OR of **high intensity** at a **local level** and endure in the **short term**; OR of **medium intensity** at a **regional level** in the **short term**; OR of **low intensity** at a **local level** in the **long term**; OR of **medium intensity** at a **local level** and endure in the **medium term.**
VERY LOW Significance	Impacts could be: EITHER of **low intensity** at a **local level** and endure in the **medium term**; OR of **low intensity** at a **regional level** and endure in the **short term**; OR of **low to medium intensity** at a **local level** and endure in the **short term.**
NOT APPLICABLE	No impact.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

The entire study area falls within the Maputaland-Pondoland-Albany Hotspot (MPA Hotspot), which lies along the east coast of southern Africa below the Great Escarpment (Steenkamp et al. 2004). Faunistically, climatologically and geologically the study are region is very diverse and complex. The distinctive flora of the Pondoland region is recognised as an important region of floral endemism (Van Wyk and Smith, 2001). The regional fauna has not been as extensively studied and is not known to exhibit as many unique features. The area has been settled for many centuries, and the fauna is usually considered impoverished due to overgrazing and other man-induced impacts. However, due to previous political neglect the region remains poorly studied, except for the former enclave around Port St John and various coastal resorts and reserves. A precautionary approach must therefore be adopted when assessing faunal distributions and potential impacts. Many species, including SSC, may extend further inland than currently known. They have therefore been considered even if their presence in the proposed road route has not been confirmed. During the assessment of the significance of impacts, however, only species (particularly SSC) whose presence was confirmed were used.

3.1 *Faunal Diversity*

Due to its extended length, faunal composition along the proposed road route shows regional differences. The following discussion involves the total number of species occurring along the whole route. The discussion of regional impacts, however, involved only those species occurring in the relevant road section. Due to the complexity and sheer numbers involved, no attempt is made to assess invertebrate faunal diversity in the region.

3.1.1 Amphibians

The Pondoland amphibian fauna is relatively poorly known, as is much of that of the former Transkei. This is unfortunate as the region falls at an important transition zone between a southern temperate amphibian fauna, and a tropical fauna that extends along the coastal littoral in association with the warm waters of the Aghulas Current (Poynton, 1990). The known amphibian fauna includes approximately 31 species. New taxa may well still exist in the poorly studied forest patches, river gorges and coastal grasslands. Species currently known only from coastal locations may also have relict inland populations.

The taxonomy of a number of species has been recently upgraded or requires further resolution.

- Spiny reed frogs of the *Afrixalus knysna-spinifrons* complex - These small frogs are found in disjunct populations from the Sedgefield-Knysna region to Transkei-KwaZulu Natal (Pickersgill, 1996; Channing, 2001). The assignment of former Transkei populations has been problematic. Specimens from Qolora-Port St Johns were assigned to *A. knysnae* by Channing (2001), but to *A. spinifrons* by Pickersgill (1996). Both authors assign specimens from Port Edward and the KZN South Coast to *A. spinifrons*. Current opinion restricts *A. knysnae* to the Southern Cape, and refers Wild Coast and KZN populations to *A. spinifrons* (Minter *et al.* 2004; Pickersgill 2005)
- Dainty frogs of the *Cacosternum boettgeri* complex - A number of taxa have recently been revived from synonymy (e.g. *C. platys* from the south-western Cape, Channing 2001; *C. striatum* from Cobham, KwaZulu-Natal, Harrison *et al.* 2001). Other undescribed taxa are known from grasslands in the former Transkei - KwaZulu-Natal border region (M. Burger, *pers. comm.*). It is possible that cryptic taxa may occur in the Pondoland region, which has been poorly sampled for these small frogs.

3.1.2 Reptiles

Approximately 60 species of reptile are recorded or are likely to occur along the proposed route (Branch, 1998). Whilst some are wide-ranging species, e.g. snakes such as boomslang and puff adder, others have relatively restricted distributions. The taxonomy of a number of taxa requires fuller resolution, and may involve hidden undescribed species that could be of conservation concern. Besides the sensitive and localised species discussed below, a number of other taxa show regional variation within the study area that may indicate the presence of undescribed species.

- Common slug-eating snake (*Duberria lutrix*) - Some individuals in the former Transkei coastal region are large and grey spotted, unlike slug-eaters elsewhere. They occur in the Port St Johns region and the taxonomic status of these specimens needs further study as they may represent an undescribed species.
- Giant legless skink (*Acontias plumbeus*) - The southern population around East London is well-isolated from northern populations with no records known for the intermediate Wild Coast region. It shows a number of subtle differences (Bourquin and Lambiris, 1996) from more typical northern populations and may represent a new species.

• A small snake collected from the Mbashe River Mouth (Broadley, pers. comm.) is currently unassignable to any other African snake and remains an enigma. Although it is not known to occur along the proposed road route, and resolution of its scientific status awaits the discovery of further specimens, the species may be present in the Mthatha region. Should it be discovered during road construction attention to its conservation status would require immediate attention.

• Dwarf chameleons (*Bradypodion* sp.) - Found in isolated populations in forest and thicket habitats, the taxonomy of South African dwarf chameleons is problematic. Raw (1995) indicated that numerous undescribed species of dwarf chameleon occurred in the eastern regions of South Africa, including new species from the Mkambati Nature Reserve, Mtamvuna Nature Reserve, and Oribi Gorge region (Raw 2001). However, the status of these putative new species remains unresolved, they have not been formally described. Phylogeographic studies (Tolley *et al.* 2004, 2006) support cryptic genetic diversity in chameleons from central and northern KwaZulu-Natal, but comparable diversity has not been noted in the Transkei-southern KZN region. Despite this these populations (species ?) have very restricted distributions and may be of conservation concern.

3.1.3 Birds

The former Transkei region has a rich avifauna (Quickelberge, 1989; Harrison et al., 1997), with nearly 500 species recorded from the region (approximately half of the species recorded from the subcontinent). They include numerous sensitive and threatened species. The coastal mosaic of grassland and forest habitats serves as an important area for montane species in winter. Many Intra-African summer migrants also use the region both for breeding and in transit to more southerly areas.

3.1.4 Mammals

The area of interest has a diverse mammal fauna with nearly 80 species recorded from the region, comprising 11 insectivores, 19 bats, 3 primates, 2 lagomorphs, 19 rodents, 15 carnivores, antbear, 2 hyrax, bushpig, and 5-6 small antelope (Branch 2003). However, the surviving mammal fauna of the Wild Coast is now impoverished by the local extinction of many of the megaherbivores (elephants, buffalo, rhino, eland, etc.) that previously played an important function in landscape engineering, and that were key elements in maintaining many aspects of vegetation dynamics. The few large megaherbivores surviving in the region include the ubiquitous bushbuck (*Tragelaphus scriptus*), common duiker (*Sylvicapra grimmia*), and Cape Grysbok (*Raphicerus melanotis*). In addition, Chacma baboon (*Papio ursinus*),

Vervet Monkey (*Ceropithecus aethiops pygerythrus*), bush pig (*Potamochoerus porcus koiropotamus*) and a variety of small carnivores (viverids, genets, Cape Clawless Otter, etc) survive in small pockets. All are non-threatened, and many have successfully adapted to surviving in peri-urban areas, where some may become pests. Skead (1987) notes records of five leopards killed in the Mkambati – Ntsimbini region between 1952-1962, and it is possible that a few specimens still exist in the more inaccessible kloof forests. With effective protection leopard can repopulate areas relatively quickly, as shown by the natural appearance of leopard in several Eastern Cape game lodges (e.g. Shamwari) following conservation and increasing populations of natural prey.

3.2 Species of Special Concern

Threatened species in a number of groups has been reviewed subsequent to the previous report, e.g. amphibians (Minter et al. 2004) and mammals (Fieldmann and Daly 2004). In addition, as part of the National Environmental Management: Biodiversity Act (NEMBA), 2004, the Department of Environmental Affairs (DEAT 2007) has also published a somewhat controversial list of threatened and protected species in South Africa. Changes in the threatened status of species discussed in the previous report (Branch 2003), and species on the NEMBA list are discussed in fuller detail below and summarised in Table 3.1 (see appendix).

3.2.1 Invertebrates

Due to the sheer magnitude of the groups, invertebrates are rarely considered in detailed assessments of environmental impacts although butterflies are increasingly discussed. This is more a reflection of the easy availability of field guides (e.g. Migdoll, 1987) to the group and a recent synopsis of threatened taxa (e.g. Henning and Henning, 1989). These in turn result more from the charismatic attraction of the group rather than to any distinctive or seminal role that they play in ecosystem functioning. Although no regional Red Data Book exists for many invertebrate groups, a number of species in diverse groups have been identified as being of conservation concern and are discussed below.

- Butterflies A number of rare butterflies from the Pondoland region are included in the South African Butterfly Red Data Book (Henning and Henning, 1989), including:
    - Pondoland Charaxes (*Charaxes pondoensis*) - Rare, Port St. Johns, Mkambati NR. Amakoza Rocksitter (*Durbania amakosa albescens*), Rare, Margate.
    - Southern Aslauga (*Aslauga australis*) - Rare, East London, Mbashe River, Doutza Pass, Port St. John's.
    - Bicolored Abantis (*Abantis bicolor*) - Rare, East London, Mbashe River, Port St. John's.
- Pulmonate Molluscs Two terrestrial slugs have been indicated as candidates for inclusion in the IUCN 'Red List' of threatened species (Herbert, 1997). These include:
    - *Chlamydephorus burnupi* - known from a few scattered localities in KwaZulu-Natal, and with a single record from Port St. Johns.
    - *Chlamydephorus dimidius* - known from a few scattered localities in KwaZulu-Natal, and with a single southern record from Mtamvuna Gorge.
- Cicadas Due to their long, unusual life cycles, cicadas are known to be sensitive to habitat fragmentation (Rodenhause et al., 1997). These large, noisy and enigmatic insects show high levels of endemism and a number of new, highly-localised species have been described from the former Transkei region (Villet, 1997, 1999). Both are recorded from coastal forest, thicket and forest fringes.
    - *Stagira pondoensis* is known only from Port St John and nearby Vernon Crookes Nature Reserve in KwaZulu-Natal.
    - *Nyara thanatotica* occurs at Port St Johns and Bosbokstrand. This taxon is taxonomically more important as it is a monotypic genus.
- Millipeds Like cicadas, millipeds often show high levels of endemism. Moreover, the distribution of endemism is often discordant with that of other groups (Burgess et al., 1998). Although there is no updated review of southern African millipeds highlighting threatened taxa, a new species has recently been described from forest habitat in the Lusikisiki District (Alderweireldt, 1998).
- Archaeid spiders The Afrotropical Archaeidae is a small family of very rare spiders known from southern Africa, Madagascar and Australia. In the subcontinent is represented by two genera and 12 species. *Eriauchenius coronatus* is known from only two specimens and is endemic to the Vernon

Crookes Nature Reserve where it inhabits grassland at the forest-grassland ectotone. Two endemic species of *Afrarchaea* have been described (Lotz 2007) from leaf litter in isolated coastal forests in the Eastern Cape, including *A. haddadi* (Komga, Kei Mouth) and *A. woodae* (Komga and Cwebe Nature Reserve).

3.2.2 Amphibians

Global amphibian declines are now well-documented, and as a group they are more threatened than either mammals or birds (Beebee and Griffiths (2005). The IUCN's Global Amphibian Assessment indicates that as many as a third of the 5700 known species have undergone severe declines or even extinctions (Stuart et al. 2004). Due to their aquatic larval stages and generally terrestrial adult lives, they have been championed as 'indicators' of ecosystem health.

The threatened status of amphibians along the proposed route has subsequently been revised (Minter *et al*. 2004). Five amphibian species of special concern were listed in Branch (2004), i.e. *Afrixalus knysnae* (Data Deficient), *Leptopelis natalensis* (Sensitive), *Natalobatrachus bonebergi* (Endangered), *Cacosterum striatum* (Data Deficient) and *Pyxicephalus adspersus* (Near Threatened). Both the taxonomy and conservation of the first has changed, with *Afrixalus knysnae* restricted to the southern Cape region, and *Afrixalus spinifrons* applied to dwarf leaf-folding frogs of the Eastern Cape and KwaZulu-Natal. This taxon is now considered Endangered (Minter *et al*. 2004). The conservation status of the other taxa has not changed, although Near Threatened status for the Giant Bullfrog is a regional assessment, and the species is not considered threatened elsewhere in Africa. Fuller species details can be found in Branch (2004).

A number of regional endemics occur along the route, including:

- Bush squeaker (*Arthroleptis wahlbergi*) – KwaZulu-Natal, reaching its southern limit at Port St. John's;
- Natal ghost frog (*Heleophryne natalensis*) – Eastern Cape to Mpumalanga escarpment, reaching its southern limit Mtamvuna Gorge;
- Natal chirping frog (*Arthroleptella hewitti*) – KwaZulu-Natal, reaching its southern limit at Mkambati NR;
- Forest tree frog (*Leptopelis natalensis*) – KwaZulu-Natal, reaching its southern limit at Port St. Johns;

- Natal spiny reed frog (*Afrixalus spinifrons*) – Port Edwards, Port St Johns, Butterworth-Qolora; and
- Kloof frog (*Natalobatrachus bonebergi*) – Port St. John's to Ngoye Forest.

A number of tropical species reach their southern limit in the region and these populations are therefore also sensitive. They include:

- Long reed frog (*Hyperolius acuticeps*) – Mkambati;
- Water lily frog (*Hyperolius pusillus*) – Dwesa;
- Dwarf puddle frog (*Phrynobatrachus mababiensis*) – East London;
- Sharp-nosed grass frog (*Ptychadena oxyrhynchus*) – East London; and
- Striped grass frog (*Ptychadena porosissima*) – East London.

3.2.3 Reptiles

The previous SA Red Data Book – Reptiles and Amphibians (Branch 1988) remains woefully out of date. Over 100 species have been described or recognised as valid species in South Africa since that publication (Branch 1998 and updates). Moreover, some of the threatened categories used in that assessment (e.g. Rare, Peripheral) are no longer used internationally. Many reptiles included in the old Red Data list (Branch 1988) would not fall in to threatened categories using modern criteria, whilst conversely many new species are undoubtedly of conservation concern. Many species have very restricted distributions that under IUCN criteria (Mace and Lande 1991) would place them in Vulnerable or Endangered categories. These endemic species are thus candidates for inclusion in a modern SA RDB revision. The Variable burrowing skink (*Acontias poecilus*), previously considered to be very localised (Bourquin and Lambiris 1996; Branch 1999) in the northern Transkei – southern KZN region, is now thought to be more widely distributed into Maputoland (S. Daniels pers. comm. 2006). Despite previous claims (Raw 2001), no cryptic species of dwarf chameleons *(Bradypodion* sp.*)* are now thought to occur in habitats along or adjacent to the proposed route (Tolley *et al.* 2004, 2006). The Forest thread snake (*Leptotyphlops sylvicolus*), perhaps the smallest in the world (to 110mm), is known only from a few scattered forests in coastal KwaZulu-Natal, and with a single record from Port St. Johns. It is probably of concervation concern, although its IUCN status has not yet been formally assessed.

3.2.4 Birds

A significant number of threatened (3 Endangered and 12 Vulnerable) and Near-Threatened (12) species (Barnes 2000) occur along the proposed road route, as well as a number (3) of sensitive species dependent upon forest habitat.

- Blackrumped buttonquail (*Turnix hottentotta,* Ingolwane) - Nationally Endangered.
- Cape Parrot (*Poicephalus robustus*, Isikhwenene) - National Endangered and Endemic.
- Spotted Thrush (*Zoothera guttata,* Unomacetyacetyana) - Globally Endangered
- White-backed Night Heron (*Gorsachius leuconotus*) - Vulnerable.
- Cape Griffon Vulture (*Gyps coprotheres*, Ixhalanga) - Vulnerable.
- Martial Eagle (*Polemaetus bellicosus*, Ukhozi) - Vulnerable.
- African Marsh Harrier (*Circus ranivorus*, Isigobodo) - Vulnerable.
- Grey Crowned Crane (*Balearica regulorum*, Ihem) - Vulnerable.
- African Finfoot (*Podica senegalensis*, Umngcana) - Vulnerable.
- Stanley's Bustard (*Neotis denhami*, Iseme) - Vulnerable.
- Delegorgue's Pigeon (*Columba delegorguei*, Indenga) - Vulnerable.
- Grass Owl (*Tyto capensis*, Isikhova) - Vulnerable.
- Mangrove Kingfisher (*Halycon senegaloides*, Isaxwila) - Vulnerable.
- Natal Nightjar (*Camprimulgus natalensis*, Unyabayo) - Vulnerable.
- Southern Ground Hornbill (*Bucorvus leadbeateri*, Intsikizi) - Vulnerable.
- Knysna Warbler (*Bradypterus sylvaticus*) - Vulnerable/Endemic.

Near-Threatened and Sensitive species include:

- Black Stork (*Ciconia nigra*, Unocofu) - Near-Threatened.
- Secretary bird (*Sagittarius serpentarius*, Ingxangxosi) - Near-Threatened.
- Crowned Eagle (*Stephanoaetus coronatus*, Ukhozi) - Near-Threatened.
- Black Harrier (*Circus maurus*, Isigobodo-esimnyama) Near-Threatened/Endemic.
- Lanner Falcon (*Falco biarmicus*, Ukhetshe) - Near-Threatened.
- Blackwinged Plover (*Vanellus melanopterus*, Unotyhiniphi) - Near-Threatened.
- Blackbellied Korhaan (*Eupodotis melanogaster*) - Near-Threatened.
- Half-collared Kingfisher (*Alcedo semitorquata*, Isaxwila) - Near-Threatened.
- Ground Woodpecker (*Geocolaptes olivaceus*, Umgximde) - Near-Threatened and Endemic.
- Knysna Woodpecker (*Campethera notata*, Isinqolamthi) - Near-Threatened and Endemic.
- African Broadbill (*Smithornis capensis)* - Near-Threatened.

- Broadtailed Warbler (*Schoenicola brevirostris*, Umvokontshi) - Near-Threatened.

The threatened status of some taxa has been upgraded in the NEMBA list (DEAT 2007), e.g.:
Cape Parrot (*Poicephalus robustus*) - Critically Endangered
Blue Crane (*Anthropoides paradiseus*) - Endangered
Grey Crowned Crane (*Balearica regulorum*) - Endangered
Cape Griffon Vulture (*Gyps coprotheres*) - Endangered

3.2.5 Mammals

The previous assessment (Branch 2003) noted seven species of conservation concern (six Vulnerable and one Near-Threatened), whilst a further four sensitive species depended on forest habitats. The threatened status of mammals along the proposed route have subsequently been revised (Friedmann and Daly 2004), and their previous conservation status (noted in brackets below) has been adjusted where necessary. The threatened category Rare (Smithers 1986) is no longer treated as a formal conservation category. One species, the Rough-haired golden mole (*Chrysospalax villosus*), previously classified as Vulnerable (now Critically Endangered, Friedmann and Daly 2004), was included on precautionary grounds by Branch (2004) but is not definitely known to occur along the proposed route and is excluded in the current review.

With the local extinction of most of the large mammals, few mammals of conservation concern now survive in the region. The only large predators that may survive in the region are the leopard and brown hyena. Both are currently expanding their presence in the Eastern Cape region due to the proliferation of private and national reserves, particularly in the western part of the province. However, both occur in the Wild Coast region as a vagrant or in numbers too low to presently be considered a meaningful component of the surviving fauna. The following threatened mammals (previous status in brackets) of the region include:

Oribi (*Ourebia ourebi*)	Endangered (Vulnerable).
Samango Monkey (*Cercopithecus mitis*)	Endangered (Rare).
White-tailed Rat (*Mystromys albicaudatus*)	Endangered (Vulnerable).
Giant golden mole (*Chrysospalax trevelyani*)	Vulnerable (Vulnerable).
Tree hyrax (*Dendrohyrax arboreus*)	Vulnerable (Rare).
Blue Duiker (*Philanthomba monticola*)	Vulnerable (Rare).

Honey badger (*Mellivora capensis*)	Near Threatened (Vulnerable).
Serval (*Felis serval*)	Near Threatened (Rare).
Africa striped weasel (*Poeciligale albinucha*)	Data Defficient (Rare).
African wild cat (*Felis lybica*)	Least Concern (Vulnerable).
Aardvark (*Orycteropus afer*)	Least Concern (Vulnerable).
Aardwolf (*Proteles cristatus*)	Least Concern (Rare).
Thick-tailed bushbaby (*Otolemur crassicaudatus*)	Least Concern (Rare).

Because their distributions are often constrained by the patchy occurrence of suitable breeding and roosting sites, bats are the most threatened mammal group and 58% are of conservation concern (Friedmann and Daly 2004). A number of threatened species occur in the region, although no roosting sites are documented.

Damara Woolly Bat (*Kerivoula aregentata*)	Endangered
Swinny's Horseshoe Bat (*Rhinolophus swinnyi*)	Endangered
Lesser long-fingered bat (*Miniopterus fraterculus*)	Near Threatened
Schriebers' long-fingered bat (*Miniopterus schreibersii*)	Near Threatened
Temminck's hairy bat (*Myotis tricolor*)	Near Threatened
Cape horseshoe bat (*Rhinolophus capensis*)	Near Threatened
Geoffroy's horseshoe bat (*Rhinolophus clivosus*)	Near Threatened
Lesser Woolly bat (*Kerivoula lanosa)*	Near threatened

The change in threatened status of the mammals present in the region results in a small increase in the overall conservation status. Three species are upgraded to Endangered (oribi, samango monkey and white-tiled rat), and two species previously considered Rare (not an internationally recognised conservation category) have been upgraded to Vulnerable (tree hyrax and blue duiker). However. oribi, samango monkey, tree hyrax and blue duiker are not endemic species and have wider ranges in Africa. Only oribi is included as Endangered on the NEMBA list (DEAT 2007), whilst samango monkey is listed only as Vulnerable and White-tailed Rat is not even listed among the list of protected species. The conservation status of all these species (except the White-tailed Rat) is a regional, not a global assessment. Three species (African wild cat, aardvark and honey badger) have had their conservation status, even in a regional context, downgraded to either Near Threatened or of Least Concern.

4 IMPACT IDENTIFICATION AND DESCRIPTION

4.1 Introduction

Roads and their associated vehicle traffic may impact terrestrial fauna in diverse ways (Pienaar, 1968; Andrews, 1990; Forman and Alexander, 1998; Sheate and Taylor, 1990; Bellamy et al., 2000; Spellerberg and Morrison, 1998). The main impacts during construction involve the loss and fragmentation of habitats, with a consequent loss of biodiversity and possibly loss of species of special concern. This may result from direct land clearance, or occur indirectly via loss or changes in habitats due to consequent changes in drainage patterns, increased fire risk, or secondary impacts associated socio-economic factors resulting from changes in surrounding land use. During the operational life of the road, small cumulative impacts also occur, including ongoing road mortalities, increased disturbance (noise and light), dust generation, air pollution, chemical contamination from petroleum and rubber products, increased litter, change in the incidence of fire, and the introduction of alien vegetation. All of these factors may impact the surrounding fauna and ecological processes in different ways. Due to the length of the proposed road route, it passes through varied vegetation types, climatic zones, and regions of different historical and current land use practises. Together these factors introduce regional differences in the impacts the proposed road route will have on the fauna.

4.2 Relevant legislation

A number of National Acts contain key legal considerations of importance to the proposed project. The applicable legislation includes:

National Environmental Management Act, Act No. 107 of 1998 (NEMA)

NEMA states that “the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people’s common heritage.” It requires that:

- “development must be socially, environmentally, and economically sustainable”,
- “disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.” ,
- “a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions”

Environment Conservation Act No 73 of 1989 Amendment Notice No R1183 of 1997

The ECA states that development must be environmentally, socially and economically sustainable. A Developer is required to undertake Environmental Impact Assessments (EIA) for all projects listed as a Schedule 1 activity in the EIA regulations in order to control activities which might have a detrimental effect on the environment. Such activities will only be permitted with written authorisation from a competent authority. Sustainable development requires the consideration of the following:

- that pollution and degradation of the environment is avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and
- that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied.

National Forests Act (Act no 84 of 1998)

According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that ' no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'. The Act also prohibits the destruction of indigenous trees in any natural forest without a licence.

National Environmental Management: Biodiversity Act (Act No 10 of 2004)

In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorization of the area (not just by listed activity as specified in the EIA regulations).
- To promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

Eastern Cape Environmental Conservation Bill, 2003

This Bill provides for the declaration of Provincial protected areas; for the management of biodiversity in the Province; and for Provincial coastal management. It also regulates air quality and waste management in the Province. It provides a number of schedules which protect endangered flora and fauna and for which a permit is required.

Eastern Cape Provincial Nature Conservation Ordinance (PCNO) 1974

This regulation provides protection of certain fauna and flora within the Eastern Cape

4.3 Nature of Impacts

General aspects of the nature of these impacts are discussed below. The rating and significance of these impacts resulting from the different projects in the various sections along the route corridor are assessed in section 5.

4.3.1 Impact 1 – Loss of sensitive habitats

In general terms, terrestrial fauna are linked to certain vegetation types, i.e. forest, grassland, savanna, etc. However, depending on the particular lifestyle of the animal concerned, physical characteristics of the environment may be more important than the plant species that define the vegetation types. Thus, forest specialists may inhabit various forest types, including Coastal, Afromontane or Riparian forest. Waterbirds and amphibians may utilise varied aquatic systems, preferring swamps, streams, or fast-flowing rivers. Many lizards inhabit rock cracks, and their distributions are linked to the underlying geology, rather than the overlying plant communities.

By their nature, forest habitats are rarely confluent over large areas, particularly in areas such as the former Transkei where there has been a long history of human dependence upon natural resources. They remain as a fragmented archipelago of habitats, restricted to relatively inaccessible south-facing gorges and steep river valleys. Species inhabiting forests are usually highly adapted to the moisture, light and thermal regimes occurring within them. Such specialist species rarely survive in other habitats, and as forests become lost and increasingly fragmented, so does the specialist fauna inhabiting them. Forests, therefore, contain the highest number of threatened taxa, and also harbour numerous endemic species. In addition to specialists, well-wooded habitats such as forests, thickets and bushclumps, also serve as important nesting sites for many common birds, as well as temporary

refugia and corridors for migrating forest specialists, e.g. emerald cuckoo, blue duiker, serval, Samango monkey, etc. In the coastal region, where there is a mosaic of forest and grassland, many bushclumps are situated on large termite mounds that serve as shelter for mongoose, porcupines, aardvarks, and other small mammals. They forage in the surrounding grasslands at night, utilising the bushclumps and adjacent forests for shelter.

Wetlands also form fragmented and specialised habitats. They are essential breeding grounds for many frogs and serve as feeding grounds for threatened cranes, other waterbirds, otters, and numerous frog-eating snakes. They are easily impacted by water abstraction for commercial farming, siltation from overgrazing, pollution from urban sewage, insecticide and herbicide run-off from agricultural lands, and petroleum spillage on roads. With burgeoning human populations, isolated yet essential water sources are under increasing pressure.

Although rarely subject to human pressure, rock outcrops and cliff faces often shelter a specialist lizard fauna, and also serve as inaccessible, safe nesting sites for many birds, particularly the endangered Cape Griffon Vulture. Rock outcrops may be blasted during construction of road cuttings, or viewed as sources of in-fill during road construction. However, due to their isolated habitats and the difficulties of moving between them, specialist rock-living lizards are often highly endemic. Rock outcrops should always be surveyed prior to developments to determine whether they harbour endemic species. Due to the habitat diversity, rock outcrops often form faunal hotspots, particularly as they are naturally protected from the historical impacts of overgrazing and excessive fire regimes.

Although the proposed road route bisects no protected reserves, various protected or scientifically important areas do occur adjacent to the proposed road route. These areas are important for the protection of biodiversity and/or threatened species, and the road's construction and operation may cause secondary impacts to them. The Mkambati Nature Reserve (31°16'S, 29°59'E; c. 8000 ha) extends inland from the north-east Pondoland coast, and is bounded by the Mtentu River in the north and the Msikaba River in the south. It stretches inland c. 5km along the Msikaba River and c. 9.5 km along the Mtentu River. It is a fully protected Nature Reserve controlled by Eastern Cape Nature Conservation, and is intended to form the core of the proposed Pondoland National Hertiage Park. It previously included an important breeding colony (40-70 pairs) of the Cape Griffon Vulture on cliffs overlooking the Mtentu

River, however, this breeding colony has now been abandonded although the cliffs are still used by roosting vultures (Piper 2007). Mtamvuna Nature Reserve (31°00'S, 30°10'E; 3257 ha; KwaZulu-Natal provincial reserve, fully protected) is located some 5km west of Port Edwards and occupies the eastern side of a steep gorge on the Mtamvuna River. It also once included an important breeding colony of Cape Griffon Vulture, but this colony is also in decline.

No existing National Parks occur in the vicinity of the proposed road route, although discussion is presently underway for the establishment of the Pondoland National Heritage Park (Hetherington, 2001). However, numerous socio-economic problems still block agreement on the inland boundaries and controls to be implemented in the proposed park. It still awaits proclamation. If this project does come to fruition, the new reserve will have a unique structure, incorporating formally protected areas, as well as traditional communal lands. It is proposed to extend from the north bank of the Mzimvubu River at Port St. Johns to the south bank of the Mtamvuna River near Port Edward, and to incorporate the Mkambati Nature Reserve.

Important Birds Areas (IBA) form a network of sites, at a biogeographic scale, which are critical for the long-term viability of naturally occurring bird populations (Barnes, 1998). Two IBAs occur adjacent to, or in close proximity to, the proposed road route are the Mkambati Nature Reserve (31°16'S, 29°59'E; c. 8000 ha; Eastern Cape provincial reserve, fully protected) and Mtamvuna Nature Reserve (31°00'S, 30°10'E; 3257 ha; KwaZulu-Natal provincial reserve, fully protected).

A number of other IBAs occur in close proximity to the proposed road route. These include the Oribi Gorge Nature Reserve (30°43'S, 30°14'E; 1917 ha; KwaZulu-Natal provincial reserve, fully protected), the Collywobbles Vulture Colony (32°00'S, 28°37'E; unprotected) in a gorge of the mBashe River in the Indutywa District; and the coastal, adjoining Dwesa and Cwebe Nature Reserves (32°16'S, 28°53'E, fully protected Eastern Cape provincial reserves). All lie some distance from the proposed toll road route and are unlikely to be negatively impacted by its development.

4.3.2 Impact 2 – Threats to biodiversity

The protection of the faunal and floral heritage of the former Transkei region is generally poor, and the exploitation of forest and coastal resources has been unsustainable even in the short term. Hunting of all animals in many areas continues

(White, 1999), although hunting is now largely confined to forests. This hunting pressure is compounded by the fact that the forest fragments are already too small to maintain viable long-term populations of large to medium-sized mammals. Target species have shown a decline, and the increased use of guns lead White (1999) to conclude that the remaining populations of indigenous mammals were under severe threat. In addition wild animals, e.g. monkeys, raptors, and small carnivores, such as jackal, caracal, and even crowned cranes, were often viewed as pests on livestock and crop fields and therefore killed Predation by domestic animals generates an additional impact on small vertebrates in the region.

Many secondary operational impacts are associated with increased vehicle traffic (see reviews in Forman and Alexander, 1998; Environmental Resources Management, 1996). The main impact derives from increased animal mortality, as many animals are killed or injured whilst crossing roads. This may occur: during normal movements within their home range (e.g. viverids (Taylor, 1971), snakes (Rosen and Lowe, 1994), and hedgehogs (Huijser and Bergers, 2000)); during annual breeding migrations (e.g. frogs; Fahrig et al., 1995); during seasonal migrations (e.g. many birds); or when attracted to roads either for warmth (snakes and lizards) or for food from previous road kills (e.g. vultures, crows and carnivores) or visible, wind-accumulated seeds (many small granivorous passerines and rodents). Awareness of this problem is not new (Stoner, 1925; Dreyer, 1935; Dickerson, 1939) and mortalities on roads, particularly in pristine areas, may impact significantly on long-lived, wide-ranging species. Tortoises in North America occur in significantly lower numbers in areas transected by busy roads than they do in comparable habitats with no roads (Nicholson, 1978). Similarly, short-lived, explosive breeders, i.e. species that undertake mass migrations to well-defined and long-established breeding sites (e.g. many amphibians) are very susceptible to vehicles when crossing roads during their mass breeding migrations. Roads situated next to wetlands may cause unsustainable rates of mortality to breeding frogs, particularly toads and other large species. Populations can be easily decimated at such times, and road mortalities can soon lead to local extinction (e.g. the Endangered Western Leopard Toad, *Bufo pantherinus*, in the south-western Cape; Harrison et al., 2001).

Experience at Suikerbosrand Nature Reserve, Gauteng, suggests that measures to reduce speeds on roads, such as posting reduced speed limits to minimise inadvertent vehicle impacts with wildlife, are impractical to enforce. For small amphibians, various solutions have been proposed (summarised in Langton, 1989),

including specially constructed tunnels and temporary restrictions (7-10 days) on traffic movements at night along roads adjacent to breeding ponds. Such procedures are already commonplace in European cities. Large under-road culverts for stormwater control may also serve as safe transit corridors for wildfire in areas of high impact.

4.3.3 Impact 3 – Threats to Species of Special Concern

Threatened species have been abstracted from South African Red Data Books (birds Brooke, 1984; Barnes, 2000; mammals – Smithers, 1986; herpetofauna – Branch, 1988; butterflies – Henning and Henning, 1989), the international IUCN Red List of threatened species (IUCN 2000). Updates and species for possible inclusion were obtained from the general literature (e.g. pulmonates, Herbert, 1997). The presence of endemic species was abstracted from general distribution maps present in faunal surveys (see above). A detailed list of Species of Special Concern is given in Table 3.1 (appendix)

4.3.4 Impact 4 - Impacts on the Cape Griffon Vulture

This impact can be considered a subsection of Impact 3 - Threats to Species of Special Concern. However, due to the sensitivity of this particular species, and because its status was stressed by comment from IAPs, it has been dealt with as a specific issue. It is known that highways impact birds of prey in numerous ways, both by direct mortality (particularly owls) and due to disturbance (see review Kaseloo and Tyson 2004). The road reserves of national roads are often used for additional developments, particularly the installation of telephone and powerlines. Many raptors and other birds utilise these structures for roosting, vantage sites and/or for nesting. Bridge supports and associated structures can also be used. Due to their proximity to traffic they can entice birds into the road reserve leading to increased mortality.

The sheer cliffs associated with the major river gorges that cut through the Msikaba Formation sandstones form ideal habitat for many breeding birds of prey. The most significant of these is the Cape Griffon Vulture (*Gyps coprotheres*) which is endemic to southern Africa and has the smallest distribution of any Old World vulture (Mundy *et al*. 1992). It is currently categorized as Vulnerable in South Africa (Barnes 2000) and globally (VU - A1ade+2de, C1+2b; 2007 IUCN Red List), whilst in Swaziland it is regionally extinct and in Namibia Critically Endangered. It is listed as Endangered on the NEMBA list (DEAT 2007). The world population was estimated at 4400 pairs

(12,000 individuals) at 84 breeding colonies and 83 additional roost sites (Piper 1994, in Barnes 2000). This number has steadily declined and is now thought to have dropped to less than 3000 pairs (Piper, Mundy and Vernon in Hockey *et al*. 2005; Piper pers. comm. August 2007). McKean (2007) notes that the global Cape Griffon Vulture population has dropped by 60-70% in the last 15 years.

The main threats are high mortality caused by food shortages, poisoning, and electrocution and collision with power lines (Markus, 1972; Van Rooyen and Ledger, 1999). Van Zijl (in Hockey *et al*. 2005) noted 227 Cape Griffon vultures killed in 16 poisoning incidences between 1995 and 2002. To these threats can be added unsustainable exploitation for 'muti' by traditional healers (Marshall 2007, McKean 2007). Among the many myths surrounding the use of vulture parts is the consumption of the bird's brain. The vulture is believed to have clairvoyant properties which explain their ability to find carcasses almost immediately after their death. The individual who consumes the brain supposedly receives the same clairvoyance. Possession of the dried foot of a Cape Griffon Vulture is also believed to bring success in gambling (Marshall 2007). Over 160 vultures (mainly White-backed Griffon Vulture, *Gyps africanus*, from KwaZulu-Natal) are killed each year for this trade in eastern South Africa, at a trade value of R1 200 000 (McKean 2007). It is considered that at the current levels of exploitation White-backed Griffon Vulture will become regionally extinct in 15-30 years. Current harvesting rates for the Cape Griffon Vulture are also unsustainable and will cause regional extinction in 44-53 years, even sooner (12 years) if the trade in White-backed Griffon Vulture in KwaZulu-Natal switches to its Cape cousin (McKean 2007).

The former Transkei remains the stronghold of the Cape Griffon Vulture, which still remains relatively common over the rugged terrain of the eastern Pondoland (Quickelberge, 1989). The proposed road route passes inland of the Mkambati Nature Reserve (31°16'S, 29°59'E; c. 8000 ha) which previously included an important breeding colony of the Cape Griffon Vulture on cliffs overlooking the Mtentu River. Mtamvuna Nature Reserve (31°00'S, 30°10'E; 3257 ha; KwaZulu-Natal provincial reserve, fully protected) is located some 5km west of Port Edwards and occupies the eastern side of a steep gorge on the Mtamvuna River. It also previously included an important breeding colony (40-48 pairs) of the Cape Griffon Vulture. Barnes (2000) lists additional vulture breeding colonies at:

- confluence of Gcuwa and Bawa Rivers, near Butterworth
- Collywobbles on the Mbashe River (largest breeding colony, 400+ birds)

- near Mount Ayliff
- lower reaches of Mtamvuna River (Umtamvuna NR)
- Mlengana (Execution Rock), between Mthatha and Port St. Johns
- Mtentu River, from Mkambati NR to 20 km upstream

Fig 4.1 Cliffs (centre left) previously used for vulture breeding but now used only for roosting, Mtentu River Gorge, Mkambati Nature Reserve
(photo Bill Branch)

Further small cliffs used for roosting and low levels of breeding are discussed in Piper (2007).

Currently the former Transkei remains a stronghold of the globally threatened Cape Griffon Vulture. The loss of local colonies may have regional or even national impacts depending on the proportion of the loss on total surviving numbers. The global population is now considered to be under 3000 pairs (see above), and the possible loss of the Mtamvuna River breeding colony (40-48 pairs) in section 6 would constitute a significant regional loss, and one of national/global concern. Impact on the Cape Griffon Vulture in the other road sections (1-5 and 7) does not directly affect important breeding colonies. The impact will be restricted to potential increased road mortalities, disturbance, etc., and the impact in these sections will therefore be only local in extent.

4.3.5 Impact 5 – Threats to Faunal Movements

Linear developments, such as roads and rail tracks, may disrupt the movement of species within their normal home ranges, or the seasonal movements of migratory species. Habitat fragmentation can have diverse consequences for ecosystems and their fauna and flora (see review in Saunders et. al., 1991). Apart from direct mortality associated with habitat loss and reduction of habitat quality, it can also lead to secondary effects resulting from disruption of animal movements. This can rapidly impact small, non-flying animals and disruption of gene flow can lead to loss of genotypic fitness and increased extinction potential (Gerlach and Musolf, 2000).

Habitat fragmentation may require species to make long movements between patches of suitable habitat in search of mates, breeding sites, or food. At such times they may suffer increased mortality, either directly by road vehicles, or from their natural predators due to unnatural exposure. Impacts on animal movements will be greatest in regions with high habitat fragmentation, or where linear developments transect migratory or foraging paths. Large mammals that may have undertaken seasonal movements are locally extinct throughout the road route. This potential impact is no longer relevant in the region. Reptiles and amphibians do not undertake long distance migrations, but both groups may undertake short seasonal movements. Many snakes and large monitor lizards favour high-lying, north-facing rocky outcrops in which to overwinter. They undertake movements between these and their summer foraging areas. Similarly, most frogs move to wetlands during the breeding season. Some amphibians, particularly toads, are explosive breeders, and move en masse to the breeding ponds. At such times they may suffer heavy casualties whilst crossing roads (Langton, 1989; Fahrig et al., 1995).

There is a significant movement of migratory birds, particularly Intra-African migrants, between forest patches along the East Coast littoral region and escarpment forests. Some forest species, such as spotted thrush, starred robin, bush blackcap, etc., undertake seasonal movements within South Africa between their winter and summer breeding quarters. The coastal and riverine forest patches of the Wild Coast serve as important habitats for these species. Other species overwinter in central Africa (e.g. many cuckoos, some swallows) moving south to the summer breeding grounds in South Africa during early spring. Most appear to make frequent, short movements between patches of suitable habitat.

Palaearctic waders, migrate between their Northern Hemisphere breeding grounds and southern Africa. Concern over the impact of the proposed N2 Toll Road on these migratory birds has been expressed in a number of responses to a 'form' letter available at: http://www.wildcoast.com/savethewildcoast.rtf which notes that:

> The Wild Coast *".....also serves as wintering grounds for countless migratory birds. If the plans become reality, an important building block of European ecology will be irretrievably lost*."

A submission from http://www.euronatur.org/Wild_Coast_South_Africa.390.0.html claimed that:

> "There are 39 European Migratory birds found in the area to be impacted upon by the proposed Toll Road. Two species are globally threatened: the White Stork (*Ciconia ciconia*) and the Corncrake (*Crex crex*) while one species is globally near threatened: the Lesser Kestrel (*Falco naumanii*)."

That numerous migratory birds move through the area is not in doubt. However, the claim that the Wild Coast region serves as a significant 'wintering grounds' for these species is unfounded. Few Wild Coast estuaries are sufficiently large to serve as anything other than short stopover points during migration to the larger Cape estuaries. The general lack of importance of sites in the Wild Coast region for Palaearctic waders is reflected in the absence of any mention of waders in the the SAbirding website for the Cwebe and Dwesa Nature Reserves or for the Wavecrest region (http://www.sabirding.co.za/birdspot/021323.asp). Discussion of migratory birds in the accounts of the three Important Bird Areas in the Wild Coast region (Barnes 1997) makes no reference to the importance of the area to migratory birds.

Claims of the importance of the Wild Coast for migratory birds (see above), particularly Palearctic migrants such as the White Stork and Corn Crake, are not supported by published scientific data in a review of ring recoveries from southern African waterbirds (Underhill *et al*. 1999). Not one of 720 ring recoveries for migratory European White Stork noted in this report was from the Wild Coast region. It has been noted that in South Afica the White Stork "occurs widely in the eastern half of the country, although it avoids areas directly adjacent to the east Coast" (Young *et al*. 2003). Of 100 species covered in the report (Underhill *et al*. 1999), including all important Palaearctic migrants using southern African habitats, none had significant recoveries from the Wild Coast. This is not a reflection of the lack of surveys in the region, but rather the absence of suitable wetland or estuarine habitats for these birds.

The Corn Crake (*Crex crex*) is another threatened Palearctic migrant that is rare in South Africa, and there are no recent records from the Wild Coast region (Hockney *et al*., 2005). The Lesser Kestrel (*Falco naumanii*) is a threatened Palearctic raptor that is not associated with wetlands. The claim (see above) that the proposed toll road will also impact this migrant is unfounded. South African birds are believed to originate mainly from the Far East, crossing south through India, the Indian Ocean and East Africa (Hockey et al. 2005). There are very few sightings from the Transkei region, and the species is absent from the Wild Coast except for exceptional vagrants (see maps in Harrison, et al., 1997; Hockey et al., 2005).

It is concluded that submissions (http://www.wildcoast.com/savethewildcoast.rtf and http://www.euronatur.org/Wild_Coast_South_Africa.390.0.html) claiming that the construction or operation of the proposed Toll Road will significantly impact threatened migratory species such as White Stork (*Ciconia ciconia*), Corncrake (*Crex crex*) and Lesser Kestrel (*Falco naumanii*) are unfounded.

4.3.6 Impact 6 – Invasion by alien fauna

Linear developments such as roads create a suitable corridor for the invasion of alien species. These may be carried passively into the region in vehicles. The tropical house gecko (*Hemidactylus mabouia*) has expanded its range throughout much of the KwaZulu-Natal south coast (Bourquin, 1987) and scattered towns in the Eastern Cape and Free State (Branch, 1998). It is common in caravan parks to which its has been translocated in association with road traffic. It is thought to be directly responsible for declines in coastal populations of the Pondoland flat gecko (*Afroedura pondolia*) (Lambiris and Bourquin, 1993). Alien birds, such as the Indian Myna and House Crow, have also actively expanded their range in association with urbanisation along road routes (Harrison et al., 1997), as have urban rodent pests such as the house mouse (*Mus musculus*) and house rat (*Rattus rattus*). The Norway rat (*Rattus norvegicus*) is larger and more aggressive than the house rat, but is currently restricted to major cites and towns in the coastal region (Smithers, 1983). It may prove a greater danger to indigenous small mammals than its cousin. Both rats can serve as carriers of plague. In some cases, e.g. the African cat (*Felis lybica*) and yellow-billed duck (*Anas undulata*) are threatened by hybridisation with introduced, closely-related domesticated species (e.g. domestic cat and mallard, respectively).

4.3.7 Impact 7 – Increased fire risk

Fire in many ecosystems, particularly grasslands, is a natural phenomenon and prevents thicket development. Fire in forest habitats is naturally infrequent. However, changes in water flow dynamics following road construction may reduce the water table locally, drying vegetation to unnatural levels and making it more susceptible to fire. Construction and planning of roads should anticipate an increased fire risk. Increased human population growth in the area may also occur as a consequence of increased accessibility resulting from the road development. This will also lead to an increase in accidental fires. Broken bottles at rest stops can also initiate fires.

4.3.8 Impact 8 - Chemical Pollution

Heavy vehicle traffic is associated with increased local pollution resulting from exhaust fumes, oil spillage, and accumulation of rubber compounds from tyre wear. These pollutants can cause localised impacts. Lead concentrations are high in small terrestrial mammals collected alongside roads than in bats caught in the same areas (Clark, 1979). Sensitive wetlands or patches of threatened vegetation may need protection from road surface water run-off containing such pollutants. Frog diversity in ponds affected by pollution from road run-off is depressed (Hecnar and Mcloskey, 1996). Secondary affects can also occur from the application of herbicides used to control plant growth in the road reserve and around interchanges and toll plazas. The accumulation of herbicides and their residues in adjacent wetlands can lead to developmental abnormalities in tadpoles and metamorphosing froglets (Osano et al., 2002), and also masculinization of female frogs (Dalton, 2002).

4.3.9 Impact 9 – Noise and Light Pollution

Vehicle traffic is noisy and at night also involves considerable light pollution from car headlights or road lighting in urban areas. Together these factors can depress local populations of sensitive birds and large mammals. Animals differ in the degree to which they tolerate such disturbance. Large breeding birds do not usually tolerate continuous disturbance. Breeding colonies of threatened birds, particularly vultures, should be avoided. Increased noise and motor vibrations in wetlands may also impact amphibian breeding choruses, but these will be very localised and many amphibian species are surprisingly tolerant of vehicle noise. They are less tolerant, however, of increased light levels (Buchanan, 1993) and ponds adjacent to and illuminated by road traffic or elevated lighting associated with road interchanges, toll plazas, or service facilities have reduced amphibian populations.

4.3.10 Impact 10 - Ecosystem disruption

The construction and operation of road networks can have numerous direct and indirect effects on ecosystem functioning. With linear developments such as roads, the most significant impacts relate to the fragmentation of habitats and restrictions on animal movements. The disruption of biological interactions may lead to a loss or change of ecosystem function (nutrient cycling, hydrological cycling, pollination, carbon sequestration, etc.) or blocking of linear processes. Although there is a long history of agricultural use and transformation in the region, it still retains relatively high faunal and floral diversity that contribute to local ecosystem functioning (e.g. nutrient cycles and transfer, maintenance of biodiversity, the biological components of hydrological cycles, etc.). The most sensitive habitats include forests and wetlands, and impacts will be local and negative in nature, and occur over the long-term.

5 ASSESSMENT OF IMPACTS ALONG THE ROUTE CORRIDOR

5.1 Description of Sections

The proposed route passes through regions subject to different histories and land use patterns. Areas at the extremes of the route, e.g. East London to Kei (Section 1) and the KwaZulu-Natal south coast (Section 7) are relatively heavily populated, with areas of high urbanisation, diffuse suburban development, and private agricultural lands. The central section, however, that forms much of the area falling in the former Transkei, has moderate human densities and a long history of human occupation. As a consequence, the landscape is now much degraded from its natural condition with an impoverished fauna. Much of the development of the toll road involves upgrading of existing roads and thus involves little loss of natural habitats except in the two greenfield sections (sections 4 and 6). The route corridor is divided into seven sections for convenient analysis.

Section 1: Gonubie Interchange to Ngobozi

The section (80km) between the Great Kei River and Ngobozi (via the Kei Cuttings) has been recently reconstructed. Some minor re-alignments may be necessary, and all construction activities will take place within the existing road reserve, with the exception of the Komga Interchange and the mainline toll plaza at Ngobozi.

Section 2: Ngobozi to Mthatha (Ngqeleni)

The section (145km) of existing N2 road is in poor to fair condition. Upgrading involves resurfacing of the road, replacement of guard rails, signage and road markings, provision and maintenance of fencing along the length of the route and provision of safety features (e.g. lighting, where required). All proposed initial construction works would take place within the existing road reserve, with the exception of the interchanges, intersection upgrades, community access roads, safety and access upgrades in Butterworth and Dutywa and the mainline toll plaza near the Candu River. The section of the route through Mthatha up to the Ngqeleni Intersection (approximately 15 km) would be upgraded to a four-lane dual carriageway road. The Corana and Mthatha river crossings would require additional bridges.

Section 3: Mthatha (Ngqeleni) to Ndwalane

The section (72km) comprises the existing R61 between Mthatha and Ndwalane and traverses rugged terrain. Improvements include repair of the existing road, widening of the road surface and upgrading (climbing lanes, improvements to intersections and new intersections at various points along the route), construction of community access roads, vehicular, pedestrian and livestock under- and overpasses, and dual carriageway sections at principal congregation points (St Barnabas Hospital and Thombo). The section through the Tutor Ndamase mountainous area requires slope stability measures and retaining walls at unstable cuttings. All initial construction works would take place within the existing road reserve, with the exception of short sections requiring widening, intersection upgrades, vehicular overpasses and interchanges. Measures to stabilise cuts and fills may also require additional land outside the existing road reserve.

Section 4: Ndwalane to Ntafufu River

This short greenfield section (16.5 km) begins approximately 10 km inland of Port St Johns and bypasses the existing Mzimvubu Pondoland Bridge. It involves the construction of a new road between Ndwalane and Ntafufu, including a high-level bridge over the Mzimvubu River, a mainline toll plaza in the vicinity of Ndwalane, and an 80m road reserve.

Section 5: Ntafufu River to Lusikisiki (Magwa Intersection)

This section (24.5 km) involves upgrading and rehabilitation of the existing R61 between Ntafufu and Lusikisiki (approximately 18 km) and the concrete DR 08024 from the outskirts of Lusikisiki to the Magwa Intersection. Additional infrastructure includes a grade-separated interchange to provide access to the Lusikisiki, provision of pedestrian walkways, where required, construction of over- and/or underpasses for local accessibility, and lighting where required.

Section 6: Lusikisiki (Magwa Intersection) to Mthamvuna River

The major 'greenfield' section (73.5 km) that crosses a number of deeply incised gorges (up to 200 to 300 m deep) of the Msikaba, Mthentu, Kwadlambu, Mnyameni, Kulumbe, Mpahlane and Mzamba rivers. The gorge crossings of the Msikaba and Mthentu rivers involve high-level suspension, cable-stayed or arch bridges. The road also requires an interchange for access to the Wild Coast Sun Casino, intersections for existing district roads (DR 08141, Mkamela access road, Holy Cross/Mkambati road, DR 08122 (several times) and the "Amadiba" access road), and a mainline toll plaza north of the Mthentu River crossing (with an alternative locality in the vicinity of the proposed intersection with the Holy Cross/Mkambati road). Finally the road crosses the Mthamvuna River on the existing CH Mitchell bridge. A number of alternative alignments between Lusikisiki and the Mthamvuna River are to be considered.

Section 7: Mthamvuna River to Isipingo Interchange

This section (148 km) involves rehabilitation and upgrading of the existing R61/N2, the latter including the existing N2 South Coast Toll Road. All construction activities occur within the existing road reserve, with the exception of the Adams Road Interchange and the proposed mainline toll plazas at Park Rynie and Isipingo.

5.2 Sectional distribution of Impacts along route corridor

To prevent excessive duplication the sectional distribtion of impacts along the route corridor are discussed below. The extent, nature, and significance of these impacts in the different sections are evaluated and summarised in the Impact Tables 5.3-5.9.

5.2.1 Impact 1 - Loss of sensitive habitats

Savanna and grassland habitats are usually interconnected, allowing easy movement for fauna. Habitats such as forests, thicket patches, wetlands and rock outcrops are more sensitive due to their isolated and fragmented nature. Linear developments

such as road routes may bisect and thus increase the fragmentation of these habitats. The distribution of sensitive habitats along the road route is not uniform, and most impact will occur during the construction phase in the two greenfield sections. Small wetlands, forests and rock outcrops occur along much of the length of these sections, and road construction in these regions will definitely involve the loss of wetland habitat where the road route and associated infrastructure cross drainage lines. These situations have the potential for the greatest faunal impact. The greatest number of sensitive wetland habitats occurs along the Coastal Mzamba alternative route in Section 6. These wetlands are not unique and are severely impacted by ongoing landuse impacts (see Vegetation Report), and thus of low conservation value. However, they do represent important wetlands for the surviving fauna, particularly amphibians and small wetland birds.

Some loss of forest/thicket habitat will occur along the line of the preferred route in section 4 (Ndwalane to Ntafufu River). Most forest habitat in the greenfield Section 6 (Lusikisiki (Magwa Intersection) to Mthamvuna River) are in river gorges and will not be directly affected by the preferred route. However, indirect effects mediated via changes in hydrodynamics of the adjacent wetlands, and direct effects resulting from increased human activity in the area are highly probable.

Major bridge crossings are required at five deeply incised gorges, namely the Msikaba, Mtentu, Mnyameni, Mpahlane and Mzamba Rivers. There are extensive forest patches on the gorge slopes that must be avoided during construction. Many of the bridge crossings, particularly that over the Mnyameni River, occur in visually attractive regions that have great ecotourism potential.

Evaluation

For much of its route the proposed route will have no impact on conservation areas or other sensitive sites. However, the proposed road route does come into close proximity to conservation areas and sites of scientific importance in the two greenfield sections, crossing the Mzimvuba River near Port St. Johns (section 4) and between Lusikisiki and the Mtamvuna River (section 6). In these regions impacts are highly probable and will be negative. Although local in scope, potential impacts will occur over the long-term. Impacts to sensitive forests, wetlands and rock outcrops are highly probable, and will be local and negative in nature, and occur over the long-term. The significance of these impacts may vary from low to high depending upon the local importance of the habitat and the particular fauna that it harbours. Primary

mitigation has in part already occurred with the careful selection of the road route, which avoids many sensitive habitats. Specific project actions associated with construction, access roads, borrow pits and cut-and-fill construction must avoid sensitive habitats. Natural drainage should be maintained, and the silt loads into rivers, streams and wetlands must stay within normal limits.

Most direct impact would occur via direct loss of sensitive habitats during the construction phase. This will be of High intensity in greenfield Section 4, of Medium Intensity in greenfield Section 6, and Low elsewhere. It is considered that the loss of habitat during the construction phase will be permanent as rehabilitation is unlikely. Cumulative, indirect impacts on adjacent habitats can be expected to occur during the operational phase of the project, but with mitigation (i.e. monitoring during environmental management) will probably remain of low significance.

The development of rest spots, view points or associated projects at the bridge sites must be carefully controlled in order to maintain their ecotourism potential, and also to ensure that their associated environmental impacts (e.g. erosion, litter, increased fire risk, etc.) do not impact the surrounding forest, wetland and rock outcrop habitats.

Due to the loss of sensitive habitat in the greenfield sections, particularly forest/thicket habitat in Section 4 and wetlands in Section 6, consideration should be given to the South African National Roads Agency Limited working with regional conservation authorities to assist in the formal protection of comparable habitats elsewhere in the Pondoland region, particularly in association with the proposed Pondoland National Park. Such offset action would indirectly mitigate the loss of sensitive habitat.

5.2.2 Impact 2 - Loss of faunal diversity

The distribution of biodiversity along the sections of the proposed road route is summarised in Table 5.1. Different habitats have different carry capacities, and biodiversity in closed-canopy forest and grassland is usually low. Highest levels of biodiversity occur in habitat mosaics, particularly in the coastal areas and river gorges. These differences in biodiversity associated with habitat structure are compounded by a tropical-temperate transition that occurs along the generally north-south axis of the proposed road route. Tropical regions usually host a higher biodiversity than temperate regions. The general subtraction of tropical diversity

moving south along the coast of the former Transkei has been well-documented (e.g. Poynton, 1990), and is particularly noticeable in amphibians and birds, but also occurs with reptiles and mammals.

Table 5.1 Faunal diversity along the route sections *

Group	Route Sections						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Amphibians	19	19	20	21	19	25	28
Reptiles	38	37	34	42	38	46	53
Mammals	45	38	38	50	38	48	48
Totals	**102**	**94**	**92**	**113**	**95**	**119**	**123**

* excluding birds and bats for which detailed numbers are poorly unknown

Evaluation

Due to previous rural agricultural land use practice, the central inland areas of the road route through the former Transkei have an impoverished biodiversity. Regions still retaining high biodiversity occur in association with forest, thicket and grassland habitats in the relatively pristine greenfield sections. Negative impacts to biodiversity are highly probable and will occur over the long-term and the whole route. The severity and significance of the impact will be low in most sections, and medium in the greenfield sections which retain relatively high faunal diversity. These impacts cannot be effectively mitigated.

5.2.3 Impact 3 - Loss of species of special concern

The distribution of Species of Special Concern that occur along sections of the proposed road route are summarised in Table 5.2 (the distribution of bats in the region is poorly known and they are not included). There are concentrations of threatened species in the northern sections, reflecting the tropical-temperate transition that occurs along the route. The greatest concentration occurs in the greenfield section 4, where the proposed route passes through forest habitat.

Evaluation

Impacts during the construction of the proposed road (habitat loss and fragmentation) and its operation (increased fire, disturbance, road mortality, risk of pollution, etc) will all pose a threat to the survival of populations of threatened species. All impacts will be negative. The significance of the impact will depend on the success of mitigation of primary impacts (habitat loss and fragmentation) during the design of the road route. Secondary impacts during the operational phase, with high probability, will

cause local mortalities over the long-term (effectively permanent). The Cumulative effect may have regional or national significance depending upon the individual species impacted and their conservation status.

Table 5.2 Numbers of Species of Special Concern along the route sections

Group	Sections						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Butterflies	2		1	3	2	1	1
Slugs			1	1	1	1	1
Cicadas		1	1	3	1		
Millipedes					1		
Amphibians				2	1		
Reptiles		2	1	2	2	2	2
Birds	8	6	7	20	19	16	17
Mammals *	6	5	6	7	6	6	7
Totals	**16**	**14**	**17**	**38**	**32**	**26**	**28**

* excluding bats

5.2.4 Impact 4 - Impacts on Cape Griffon Vulture

A number of previously important vulture breeding sites appear to be in decline or have been abandoned, although they may still be used for roosting. The Mtentu River colony is the closest to the proposed highway alignment, and may be affected by noise and light disturbance resulting from road traffic over the proposed bridge. The colony has shown dramatic fluctuations in numbers in recent years, and its status is of great concern (Abbott 2006). Observations on 20th June 2007 revealed no breeding birds and only three roosting vultures (Piper 2007). The position of the bridge across the Mtentu River on the preferred route alignment occurs upstream from the vulture ledges, and out of direct line of sight. Its presence is therefore not considered to directly impact the declining breeding colony.

An additional breeding colony occurs on the cliffs of the Msikaba Gorge, downstream from the proposed bridge site on the preferred alignment. The importance of the Msikaba site for breeding Cape Griffon Vulture is stressed by Prof. S. Piper (Vulture Study Group):

> "*I would estimate that there are at least 200 breeding pairs at this site and this makes it one of the most important sites IN THE WORLD for the Cape Griffon Vulture and the most important site in the Lesotho, Eastern Cape, KwaZulu-Natal, Free State complex which we estimate to hold about 35% of the*

world's breeding population..... Msikaba holds 6% of the world's population and so is a very important site."

During recent surveys (2000-2007, Piper 2007) the colony has shown a slight increase in total numbers of birds and breeding success (Fig. 5.1).

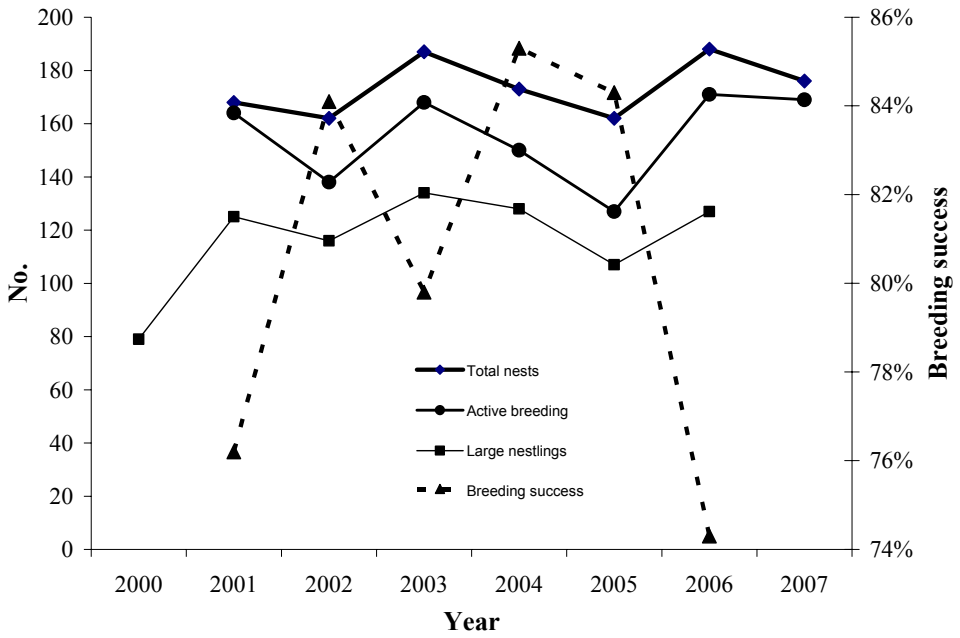


Figure 5.1 Summary of the number of pairs attempting to breeding in each of the eight years for which detailed observations were made at the Msikaba colony. (N.B. Data for 2007 based on two visits only) (from Piper 2007)

The survival of the Cape Griffon Vulture in the Transkei region depends not just on protecting the breeding cliffs from disturbance, but also in maintaining a suitable foraging environment with sufficient healthy carcasses for food. The main mortality factors for Cape Griffon vultures were ranked by experts as loss of carrion (food), inadvertent poisoning, and electrocution on electric transmission lines (Boshoff and Anderson 2006). Currently the main N2 route through the Transkei is largely unfenced and large numbers of livestock (cattle and goats) and domestic and feral dogs are killed by passing traffic. These carcasses may form a significant component of the diet of vulture populations in the region. Ironically, feeding on these carcasses may also involve vulture mortalities from the passing traffic (Branch pers. obs.). The fencing of the planned toll road will reduce the number of livestock and dog mortalities available along the route. This will reduce food available to the vultures, albeit also reducing any associated vulture mortality when attracted to the

road. The dependence of Transkei vultures on this food source is poorly studied but if important then supplementary fooding at 'vulture restaurants' may be needed (Gilbert *et al.* 2007). However, care must be taken to ensure that carcasses supplied to vultures are uncontaminated with veterinary products and agro-chemicals. The common veterinary non-steroidal, anti-inflammatory agent *diclofenac* has been implicated in the loss of 98% of Asian vulture species (Gross 2006; Gilbert *et al* 2007).

It has been noted (http://www.safcei.org.za/wildcoast/n2_mad_hatters.htm) that:

> "*As natures 'corpse processors' a demise of the vultures would lead to an increase in both human and animal disease. This in an area where medical treatment and health facilities, both human and animal, are scarce to non – existent, and where the subsistence way of life depends heavily on the well – being of domestic livestock*"

The importance of vultures in preventing disease outbreaks by removing animal carcasses is not supported by detailed medical or scientific investigation. Large areas of southern Africa are effectively 'vulture-free' with no evidence of resultant increased disease outbreaks in these areas. The same source raises the concern that:

> "..... *a road coming so close to the vulture colony in the Msikaba gorge will have an adverse affect on the birds, through human encroachment on habitat, through disturbance and by allowing easy access to the colony for harvesting. Vultures are used heavily in traditional medicines*."

Both Abbot (2006) and Piper (2007) record recent incidences of vulture losses that may be related to illegal harvesting for the 'muti' trade. This concern has been highlighted (in litt. S. Piper, 17 August 2007):

> *"It is my considered opinion that the road should NOT be within 10 km of the breeding colony. The greatest danger comes from harvesting for traditional medicine and there has been some evidence of this already, remote though the breeding colony is. Bringing the road any closer with exacerbate this serious and existing problem."*

The improving road network in the region means that even in the absence of the proposed toll road it is doubtful that the Msikaba breeding colony will continue to remain remote. What is obvious is that the area around the Msikaba colony requires

effective protection. Current ability to do this, even in protected areas such the Mtentu colony in the Mkambati Reserve, must be of concern. A more effective vehicle may be to generate protection via ecotourism ventures associated with vulture viewing. These could be modelled on existing ventures such as that at Giant's Castle in the Drakensberg, which has been noted to make "some R50 000 a year in booking fees alone - excluding accommodation and other revenue" (Piper, at http://www.ukzn.ac.za/focus/text/vol12no2/vultures.txt). More recent estimates (McKean 2007) put this revenue as high as R250 000 pa. Such ecotourism ventures may also offset the cost of supplementary feeding at vulture restaurants along the Mtentu and Msikaba gorges, and also lead to greater protection from disturbance of the breeding cliffs. However, the location of such view points and restaurants require further study to ensure they do not cause disturbance at the breeding cliffs, or that paths in the region do not cause accessory environmental impacts (e.g. erosion, introduction of alien flora or fauna, etc).

Evaluation

The Msikaba vulture breeding colony lies downstream from the bridge site which is not directly visible from the breeding cliffs (Fig. 5.2). It is concluded that the construction of the proposed bridge across the Msikaba gorge will negatively impact the adjacent Cape Griffon Vulture breeding colony. This impact will be Regional and of medium-high intensity in the long-term. It will result in an impact of High significance. However, current levels of protection for vultures in the region are inadequate, and the breeding colony in the Mtentu Gorge has been abandoned even though situated within the protected Mkambati Nature Reserve. Plans to proclaim a larger Pondoland Heritage Reserve, which may include the Msikaba breeding colony, are currently stalled and disturbance and illegal exploitation of vultures in the region are likely to continue with the 'Do-nothing' alternative. In addition, regional plans to diversify agricultural land-use options in the region, including afforestation, can be expected to directly impact food availability for vultures.

The numerous gorges of the Wild Coast region include numerous cliff faces that are used by vultures for roosting (over 140 sites have been identified in the Eastern Cape; Piper pers. comm.). The factors involved in the selection of suitable breeding sites by Cape Griffon Vultures remain unknown, as do reasons for the abandonment of previous breeding sites (e.g. the Mtentu colony). The Mtentu colony is not known to have been affected by habitat changes, and it is probable that increased disturbance or accessibility to predators may be more important.

Mitigation involves:

- Avoiding disturbance to the breeding colony. All air and road traffic associated with the planning, construction and operation of the toll road, particularly the massive engineering involved in the construction of the Msikaba River bridge, must observe the maximum possible exclusion zone around the Msikaba vulture colony. Helicopter and fixed-wing flights down the Msikaba River from the bridge site should be banned, or maintain a minimum height of 1000m (normal limit over conserved areas) in the region.
- Access to breeding ledges by humans (other than qualified researchers undertaking registered research) and feral dogs must be prohibited.
- Raptor and vulture mortalities are often associated with power transmission lines. All cables across the major river gorges in greenfield sections, either associated with either power transmission or during bridge construction, must have suitable bird diverters (BDs) installed to prevent bird collisions. A variety of structures have been designed to increase the visibility of powerlines in high-sensitive regions (Ledger 1994; Van Rooyen 1992, Van Rooyen and Ledger 1999), but the most suitable type and spacing of BDs should be determined in consultation with specialists. The impact of powerlines and cables across the major gorges on bird mortality needs to be regularly monitored. Dead or injured birds discovered below the bridge points should be identified and recorded. Results should be collated and forwarded to the Vulture Study Group (see Boshoff and Anderson 2006; Piper 2007 for details).
- No borrow pits or associated construction projects should occur in this exclusion zone.
- Blasting operations should be restricted to daylight periods, and should avoid the egg-laying season (March-July).
- Additional mitigation, to off-set the loss of carcasses (associated with reduced livestock mortalities from the fenced road) and foraging habitat, may require supplementary feeding with vulture restaurants. This, and any other ecotourism ventures involving vultures that are associated with the toll road, must include expert input from the Vulture Study Group (see Boshoff and Anderson 2006; Piper 2007 for details).

Together these mitigatory measures may reduce the impact of the toll road on the vulture colony to one of medium significance.

Fig 5.2 Msikaba Gorge looking south from proposed bridge site on east bank of the Msikaba River. The Cape Griffon Vulture colony is not visible.
(photo Bill Branch)

5.2.5 Impact 5 - Disruption to animal movements

Impacts on animal movements will be most significant for birds and mammals in regions with high habitat fragmentation. Impacts arise directly, via increased mortalities from road traffic, and also indirectly from disturbance and behavioural reluctance to cross alien habitat. The severity, and hence significance, of the impact will depend on aspects such as the local topography, habitat type, and fauna present. The effects can also act synergistically and reduce the quality of habitat available to birds and other animals alongside roads (see Reijnen and Foppen, 1994; Reijnen et al., 1995, 1997). For amphibians this impact will be greatest where the road runs adjacent to wetlands suitable for breeding. The most sensitive sections of road include the major river crossings, and forest patches of the greenfield sections.

Evaluation

It is an impact of high probability that will be negative due to increased mortality and disturbance. It will be localised and occur over the long-term. The intensity and significance of the impact will be low in most sections, but medium in the greenfield

sections containing sensitive habitats such as forest fragments, wetlands and vulture colonies.

Mitigation depends on:

- Monitoring the numbers of road mortalities and disturbance to migratory species and those that cover wide areas in their normal foraging (e.g. vultures). Where breeding toads are being killed in unacceptable numbers, under-road culverts have been effectively installed in a number of European sites to allow their movement across road barriers (Langton, 1989; Yanes et al., 1995).
- Ensuring that vegetation levels in the road reserve are maintained at low heights;
- That associated power and telephone lines are installed at the extreme edge of the road reserve and incorporate bird deflectors where they cross major river gorges.

5.2.6 Impact 6 - Invasion by alien fauna

Alien fauna, particularly birds (e.g. feral pigeons, house sparrow, starlings and Indian myna) were observed at different locations along the whole route. Introduced rodents (House mouse and Norwegian rat) are also known from throughout the region. Introduced tropical house geckos are also common, even in protected areas (e.g. Mkambati Nature Reserve, Branch pers. obs.). Feral pets (cats and dogs) are widespread, even in the greenfield sections, where poorly controlled livestock movements are also common. All secions are equally susceptible to further alien fauna introductions.

Evaluation

The whole proposed route and alternatives have already been impacted by alien fauna introductions. No provincial or national control or eradication plans for the existing alien fauna is in place, and alien animal control consists solely of trying to control the import of further potentially invasive species. Further negative impacts due to the invasion of alien fauna to the region are highly probable. They will initially be localised but will spread and occur over the long-term. The significance will generally be low as the probable alien invaders (e.g. some birds, geckos and rodents) into the greenfield sections is already underway from existing populations in urban centres throughout the route. Mitigation usually involves active culling

programs of problem animals undertaken by conservation authorities, although these are ineffective. Control by road authorities is impracticable. Pathogen transmission from alien fauna, particularly rodents, is a potential, but currently low, health risk. The impact severity and significance is low and will probably remain low in the longterm.

5.2.7 Impact 7 - Increased fire risk

Increased fire risk is a negative impact that, in varying severity, will definitely occur along the whole route. The greatest impact will occur where fire can extend into sensitive habitats occupied by threatened species, i.e. in the greenfield sections and into protected areas.

Evaluation

The impact will be localised and will occur over the long-term and can affect local ecosystems and threatened species (Thomas et al., 1998; Gerlach and Musolf, 2000). Fauna associated with forest and wetland habitats can be expected to be most at risk. Impacts in regions with a high incidence of threatened species will be more significant.

Mitigation measures include:

- Regular maintenance of the road reserve should ensure that vegetation is cut short so that it serves as an effective fire breaks, particularly where the road runs through, or adjacent to sensitive habitats such as indigenous forest/thicket and wetlands.
- Due to increased fire risk from broken bottles, cigarettes, etc., rest stops and other road associated structures should not be situated adjacent to sensitive habitats (forests or wetlands).

Adoption of these mitigation measures will reduce the intensity of the impact from medum to low

5.2.8 Impact 8 - Chemical pollution

Negative impacts from chemical pollution will definitely occur along the whole road route, and with little change in severity between the different sections. Pollution can, however, be expected to be greater at road interchanges and toll plazas, and along sections with the highest vehicle traffic flows (e.g. section 7).

Evaluation

All impacts will be localised and will occur over the long-term. The severity, and hence significance, of any impact depends on aspects such as the local topography, habitat type, and the fauna present. The impact can also act synergistically with other impacts such as increased fire risk. In all sections it is probable that the intensity and significance of the impact will be low. Mitigation measures to be implemented include:

- The use of herbicides for the control of all plant growth in the road reserve and toll plazas should be very restricted and strictly controlled. Mechanical methods of plant growth control are preferred.
- Road associated structures, e.g. toll plazas, interchanges, garages and shopping centres, etc., should not be situated adjacent to sensitive habitats such as wetlands and forest patches.
- Storm water outlets, particularly from toll plazas, should not drain into natural wetlands.

5.2.9 Impact 9 - Noise and light pollution

Increased noise and light pollution asociated with vehicle traffic will occur throughout the route. The greatest levels, but not necessarily impacts, will occur in association with highest traffic levels and where safety concerns involve installation of extensive road lighting, e.g. section 7. The intensity and significance of the impact will be greatest in the greenfield sections, where these forms of pollution are currently at the lowest. Main toll plazas will also have greater lighting and noise levels associated with changes in vehicle speeds.

Evaluation

Faunal disturbance will definitely occur due to noise and light pollution associated with construction (particularly of the major bridges in the greenfields sections) and road traffic levels during the operational phase when they will be effectively permanent. The main mitigation involves the primary siting of road lighting and toll plazas. These should not be placed next to sensitive habitats, i.e. wetlands, forests and vulture breeding/roosting cliffs. The main significance of the impact will occur in the greenfield sections, and will be Medium and cannot be mitigated during the operational phase.

5.2.10 Impact 10 - Ecosystem disruption

Two sections of the proposed route in the greenfields section impact on sensitive habitats. In the south-west the preferred route passes through a large area of intact forest/thicket habitat to the west of the Mzimvubu River (section 4), whilst in the other greenfield section (6) the preferred route will pass through wetland areas and over numerous river gorges.

Evaluation

This will result in sensitive habitat loss and fragmentation, causing a local, long-term impact of high probability and medium intensity and significance. In Section 4 the alternate route (1b) has the significant advantage of avoiding this area and thus reducing faunal impacts over the preferred alignment. Such mitigation will reduce this ecosystem impact to one of low significance.

In the north-east an alternate route (the Coastal Mzamba alternative) passes through a large area with isolated wetlands associated with drainage lines of the northern tributaries of the Mnyameni River. This option will result in sensitive habitat loss and fragmentation, causing a local, long-term impact of medium intensity and significance. The preferred route has the significant advantage of avoiding this area and thus reducing faunal impacts over the preferred alignment. Such mitigation will reduce this ecosystem impact to one of low significance.

Primary mitigation involves careful selection of the road route to avoid sensitive habitats. Specific project actions associated with construction, access roads, borrow pits and cut-and-fill construction must also avoid sensitive habitats. Natural drainage should be maintained, and the silt loads into rivers, streams and wetlands must stay within normal limits. Road traffic is associated with a high fire risk, and road reserves should retain natural vegetation but be maintained in order to function as effective fire breaks. The region already has an abnormally high fire frequency due to the extensive fires set by farmers to improve cattle grazing on communal lands (Fig 5.3).

Figure 5.3 Fire in the Msikaba Gorge and with old fires scars on western edge
(photo Mike Jennings)

Underpasses, particularly in drainage lines should be large enough to allow the maintenance of water flow and soil hydrodynamics, and also to serve as migratory paths for small animals. Together these design and mitigatory measures will maintain ecosystem functioning.

5.4 Summary of Impacts along the Sections of the Route Corridor.

The Phase, Extent, Duration, Intensity, Probability, Confidence, and Significance (with and with out Mitigation) of the various Impacts along the sections of the route corridor are summarised in Tables 5.3-5.9.

Table 5.3 Assessment of negative impacts associated with the proposed N2 Toll Road route – Section 1. Gonubie Interchange to Ngobozi

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.4 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 2. Ngobozi to Mthatha (Ngqeleni)

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.5 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 3. Mthatha to Ndwalane

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

Table 5.6 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 4. Ndwalane to Ntafufu River

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	High	definite	HIGH	HIGH	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
3 Loss of SSCs	Construction	local	short term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

Table 5.7 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 5. Ntafufu River to Lusikisiki (Magwa Intersection)

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

Table 5.8 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 6. Lusikisiki to Mthamvuna River

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Medium	definite	MEDIUM	LOW	High
	Operation	local	permanent	Medium (Low)	probable	MEDIUM	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
3 Loss of SSCs	Construction	local	short term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
4 Cape Griffon Vulture	Construction	R/N	short-term	Medium (Low)	probable	MEDIUM **	LOW	Medium
	Operation	R/N	long-term	High (Medium)	probable	HIGH	MEDIUM	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
8 Chemical Pollution	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
9 Noise and Light Pollution	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium	probable	MEDIUM	MEDIUM	Medium
10 Ecosystem disruption	Construction	local	short-term	Medium	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium

* Aspect changing with mitigation

** Although the construction period occurs in the short term the impact can be more significant (long-term, even permanent) if the vulture breeding colony is deserted because of disturbance during this phase

Table 5.9 Assessment of potential negative impacts associated with the proposed N2 Toll Road route – Section 7. Mthamvuna River to Isipingo Interchange

ISSUE / IMPACT	PHASE	EXTENT	DURATION	INTENSITY *	PROBABILITY	SIGNIFICANCE	SIGNIFICANCE WITH MITIGATION	CONFIDENCE
1 Loss sensitive habitats	Construction	local	permanent	Low	definite	LOW	LOW	High
	Operation	local	permanent	Low	probable	LOW	LOW	Medium
2 Loss of Faunal diversity	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
3 Loss of SSCs	Construction	local	short term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
4 Cape Griffon Vulture	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
5 Disruption of Faunal movement	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium
6 Invasion of Alien Species	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
7 Increased fire risk	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
8 Chemical Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
9 Noise and Light Pollution	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Medium (Low)	probable	MEDIUM	LOW	Medium
10 Ecosystem disruption	Construction	local	short-term	Low	probable	V LOW	V LOW	Medium
	Operation	local	long-term	Low	probable	LOW	LOW	Medium

* Aspect changing with mitigation

It is evident that the greatest faunal impacts will occur in the greenfield sections 4 and 6 (Tables 5.6 and 5.8). The most significant impacts (High) relate to the loss of Species of Special Concern (Impact 3), in particular the Cape Griffon Vulture (Impact 4). Both of these highly significant impacts can be mitigated reducing them to negative impacts of Medium significance. Viable ecotourism developments associated with vulture restaurants and viewing may even assist in redressing the negative impacts of increased mortality from poisoning and loss of foraging habitat and prey on the Cape Griffon Vulture that are currently increasing in the region.

6 ASSESSMENT OF ALTERNATIVES

6.1 Introduction

A number of alternative options require assessment, including:

- The “do nothing” alternative;
- Alternative route alignments; and
- Alternative positions of toll plazas.

6.2 THE “DO NOTHING” ALTERNATIVE

The “do nothing” alternative means that the anticipated negative biophysical impacts associated with building the proposed highway through the Pondoland Centre of Endemism would not materialize. However, it also precludes a number of the expected benefits of the project, including:

- Improved access and linkage to the region, in particular the Wild Coast area;
- Potential socio-economic benefits relating to employment opportunities and growth in tourism and economic development of the region.

It is sometimes claimed that “The Wild Cost is exceptional, being “undeveloped and therefore unspoilt” (http://www.gssa.co.za/bulletins/200310.pdf). However, this expresses a value judgement of regional scenic beauty, and does not reflect an understanding of existing threats to regional biodiversity, and the continuing threats by existing and ongoing impacts to the area’s uniqueness.

As noted above the faunal diversity in general, and for Cape Griffon Vulture in particular, the existing levels of impact, via habitat loss and direct exploitation, has led to significant faunal impoverishment. These impacts result from existing cultural practises, e.g. from the ‘muti’ trade, or from the lack of socio-economic development of the rural communities. It is wishful thinking that these communities ‘live in harmony’ with their surroundings in the current climate of expectant socio-economic change. Without alternative land use strategies the existing environmental impacts will almost certainly intensify with continued negative faunal impacts. Construction of the new road link may serve as a vehicle for regional development, and thus alleviate these existing impacts.

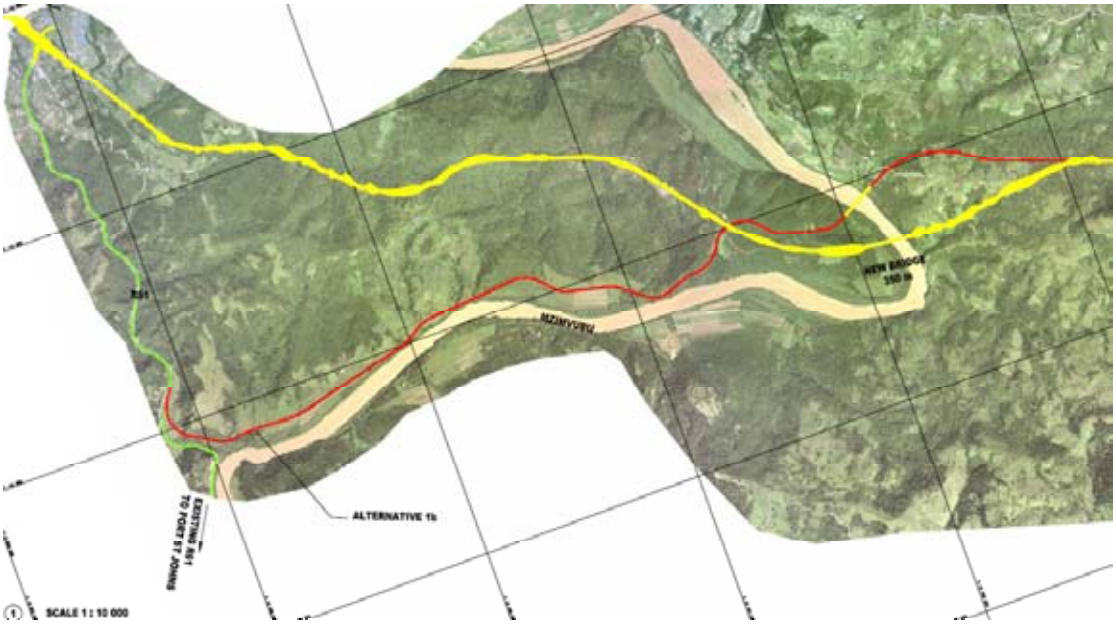
6.3 ALTERNATIVE ROUTE ALIGNMENTS

A number of alternative alignments to the preferred route in the greenfields section need to be considered. They are discussed from west to east below.

1b A major re-alignment that involves a detour from the preferred route to cross the Mzimvubu River on a new bridge alignment, and then travels through existing cleared lands along the west bank of the Mzimvubu River, and then links with the existing R61 road, which require up-grading

Evaluation The alternate route has the significant advantage of avoiding the large areas of intact thicket habitat west of the Mzimvubu River that is destroyed during construction of the preferred route. The alternate offers significant advantage in reducing faunal impacts over the preferred alignment.

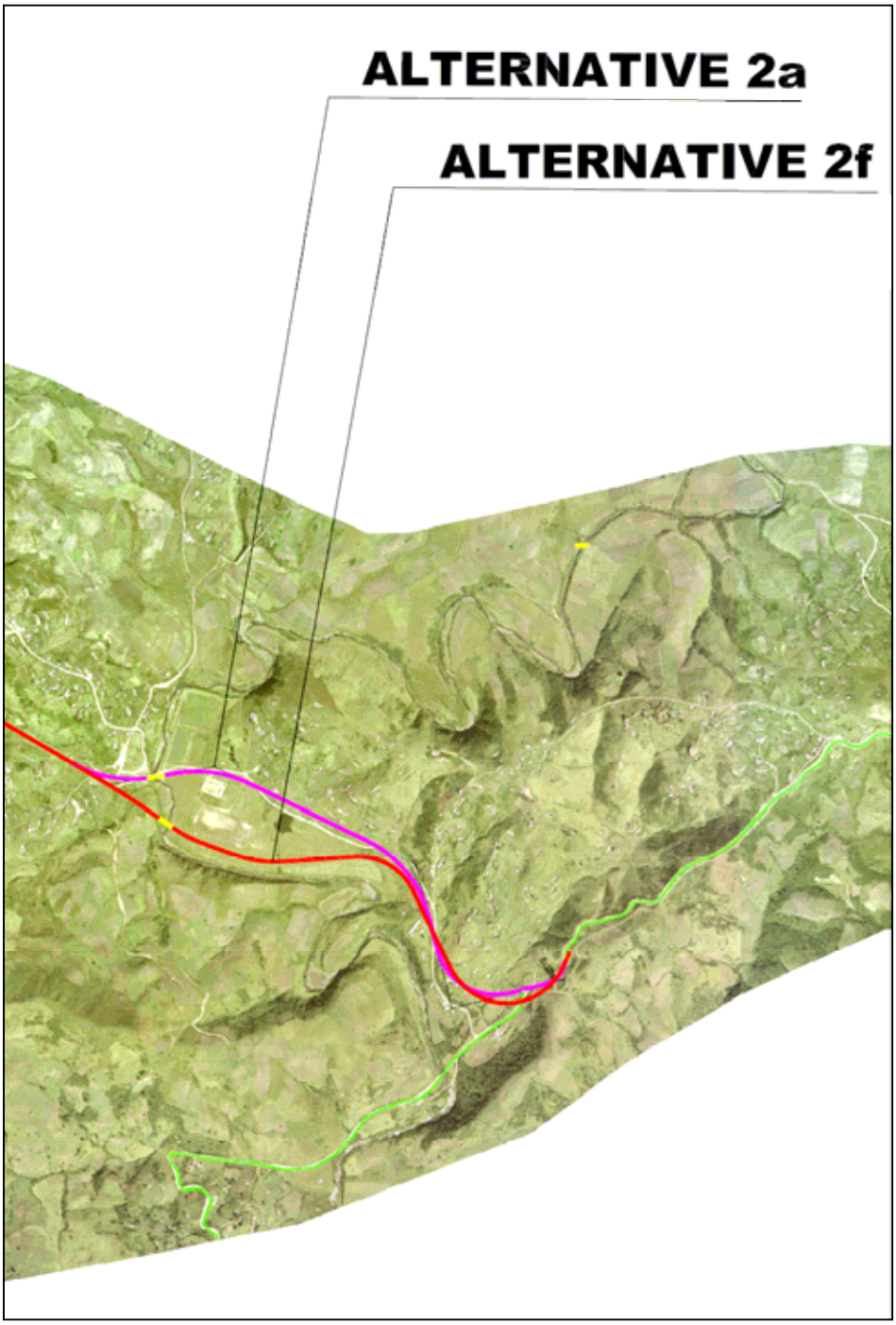
FIG 6.1 Alternative Alignments: Ndwalane to Mzimvubu River
(Alternative 1e is the SANRAL preferred route (in yellow)



2a A small re-alignment that follows more closely an existing track.

Evaluation The alternative has no advantages in reducing faunal impacts.

FIG 6.2 Alternative Alignments: Vicinity of Ntafufu Village and River
(Alternative 2f is the SANRAL preferred route (in red)

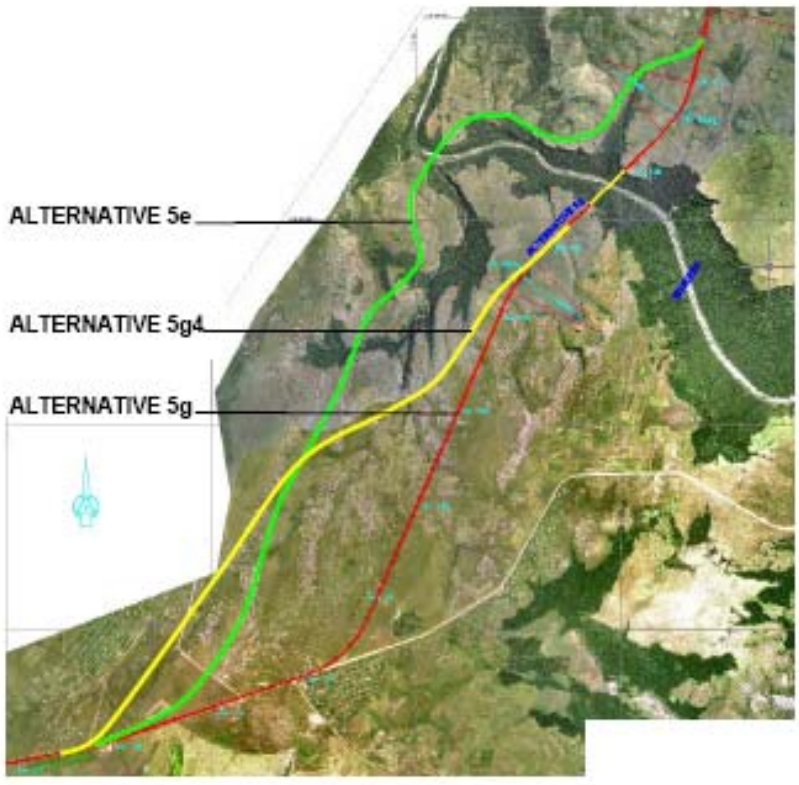


5g A small re-alignment that traverses extensive exposed bedrock of the Msikaba Sandstone formation and also the headwaters of a number of small tributaries draining into the Msikaba River.

5e A major re-alignment that in the west departs from the preferred alignment and passes close to the exceptionally scenic Mteku waterfall, where it requires a high bridge to cross the river, significant in-fill and loss of forest patches immediately to the east of the bridge, as well as another significant bridge across the Msikaba River and a route along the eastern rim of the gorge.

Evaluation The alternate routes potentially cause greater faunal impact, including disturbance to Lanner falcon nests on the cliffs at the Mteku waterfall (5e), loss of sensitive forest habitat (5e) and plants associated with the Msikaba sandstone formation (5g), as well as greater danger of erosion along the western (5g) and eastern (5e) rim of the Msikaba gorge. They offer no advantages over the preferred alignment.

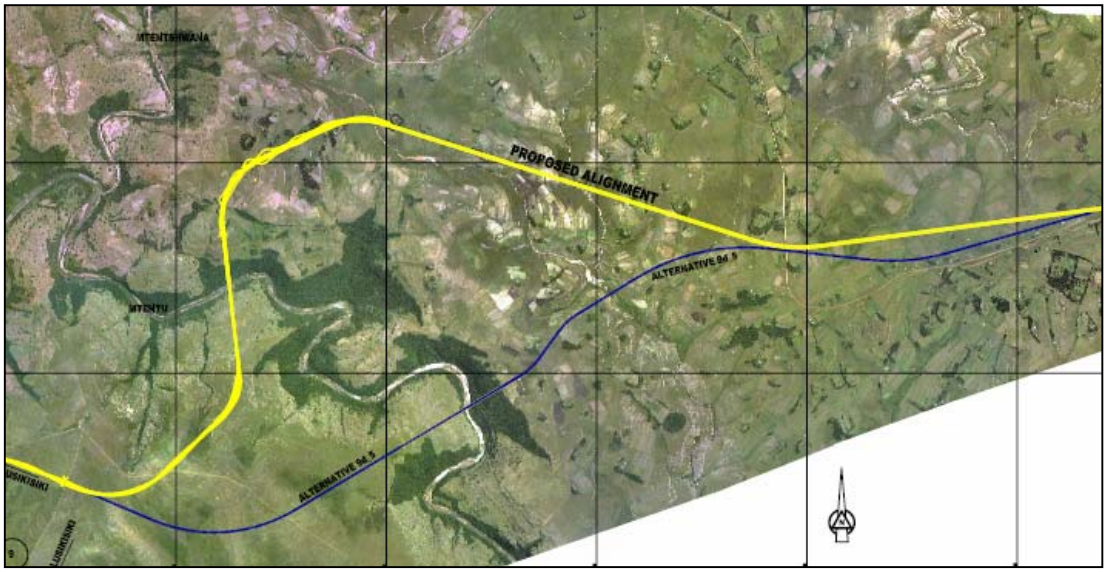
Fig 6.3 Alternative road alignments: Misikaba River
(Alternative 5g4 is the SANRAL preferred route)



9d-5 A major re-alignment that requires the construction of a major bridge across the Mtentu River. This route passes closer to a significant Cape Griffon Vulture colony than the preferred route. It also crosses large amounts of cultivated land and a large tributary of the Mtentu that may require an additional bridge, or significant road support.

Evaluation The alternate route potentially causes greater faunal impact, particularly to the Cape Griffon Vulture colony, and offers no advantage over the preferred alignment.

Fig 6.4 Alternative road alignments: Mthentu River
(Alternative 9e is the SANRAL preferred route)

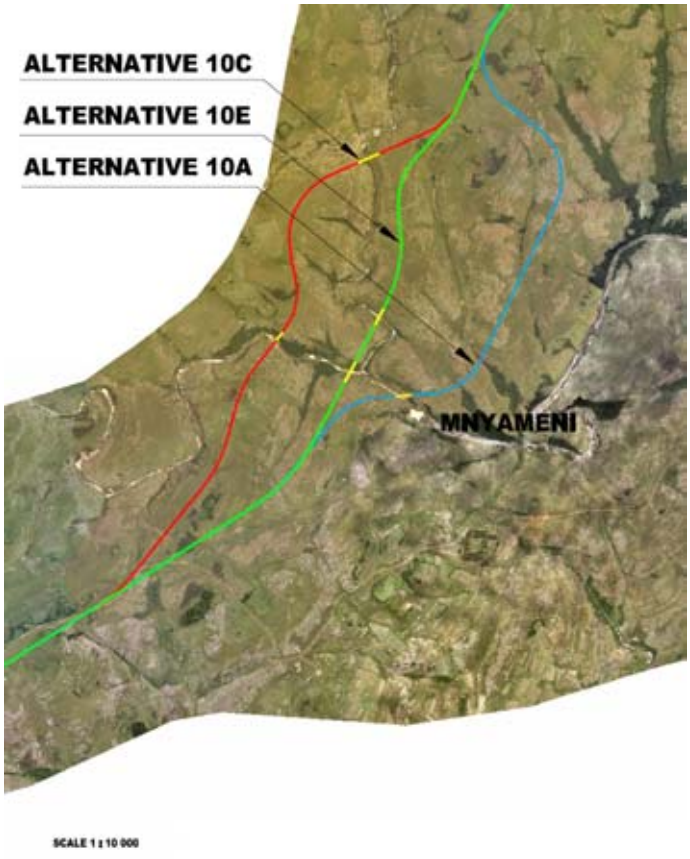


10a A major re-alignment that requires the construction of only one bridge across the Mnyameni River, and none across the Kulumbe River. However, at its eastern end the route crosses the head waters of three minor drainage lines of the Mnyameni river, before crossing the river just upstream from the Mnyameni Waterfall.

10e A variant of alignment 10a that requires two bridges (across the Mnyameni and Kulumbe rivers), but is further upstream from the Mnyameni waterfall.

Evaluation No alternate alignment passes through significant amounts of sensitive habitat (wetland or forest), although 10a does traverse three small head streams and may be expected to have greater environmental impact, with the danger of increased erosion and run-off into the Mnyameni River. There is little faunal advantage in changing the preferred alignment.

Fig 6.5 Alternative road alignments: Mnyameni River
(Alternative 10c is the SANRAL preferred route)



Coastal Mzamba route

This major re-alignment would be north of the SANRAL preferred alignment from just west of the Mzamba River and would rejoin the SANRAL preferred alignment just before the bridge crossing on the Mthentu River. It transects large wetlands in the drainage lines (at least 8) of the northern tributaries of the Mnyameni River.

Evaluation The alternate alignment passes through significant amounts of sensitive wetland habitat (Figs. 6.6-7), with the direct loss of habitat for Endangered *Spiny leaf-folding frog,* and for threatened wetland-associated birds such as Blackrumped buttonquail (Endangered), Grey crowned crane (Vulnerable, African Marsh Harrier (Vulnerable), and Grass Owl (Vulnerable). There is also a danger of increased erosion and run-off into the Mnyameni River, that may affect water quality for the Endangered Kloof Frog, and also affect adjacent kloof forest habitats used by numerous faunal SSC.

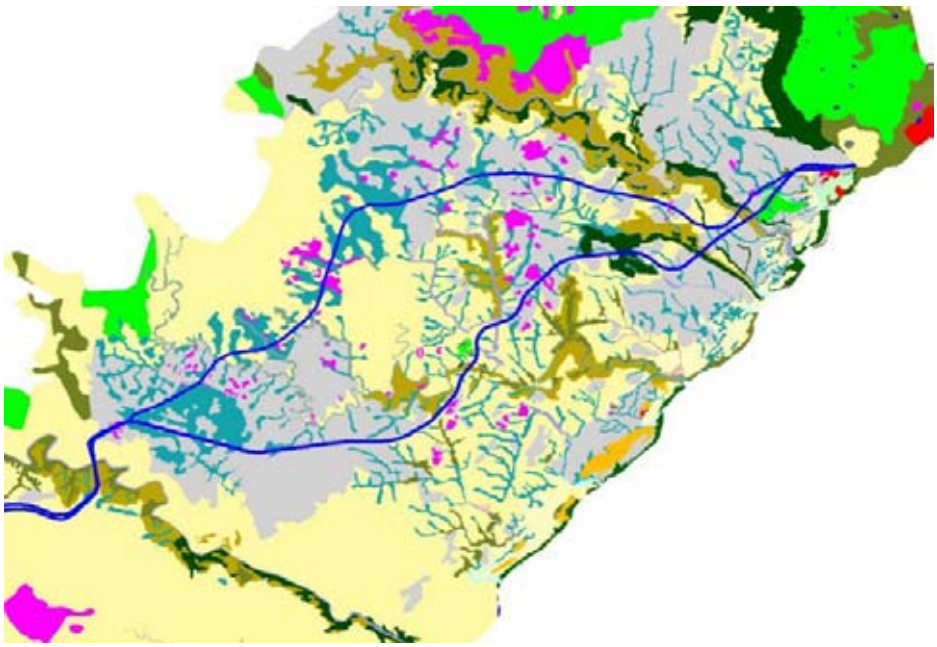


Figure 6.6 Wetlands (aquamarine colour) along the route of Coastal Mzamba alternative alignment (from Hoare 2007)

Although the SANRAL preferred alignment avoids many sensitive habitats and mainly traverses cultivated, cleared farmland, it does have a negative faunal impact by possibly curtailing future expansion of the proposed Pondoland National Park (Hetherington, 2001). However, numerous socio-economic problems still block agreement on the reserves boundaries and the controls to be implemented in the

proposed park. Even now it still awaits proclamation. The SANRAL preferred alignment will affect both the proposed reserve's scenic beauty and 'sense of place', as well as limiting movement of large mammals across the landscape.

Figure 6.7 Wetlands along route of Coastal Mzamba alternate route
(photos by M. Jennings)

Both alignments cause significant negative faunal impacts, but the SANRAL preferred alignment avoids the most sensitive habitats.

6.4 ALTERNATIVE TOLL PLAZA LOCATIONS

Alternative mainline toll plaza locations have been identified for mainline toll plaza locations namely in the vicinity of Tutor Ndamase Pass (Section 3) and in the vicinity of the proposed intersection with the Holy Cross/Mkambati road (Section 6).

All toll plaza alternatives have small footprints that do not significantly fall outside the road reserve. Main impacts will be associated with increased pollution (chemical, light and noise) and fire risk, which will last for the lifetime of the project (effectively permanently). However, all sites are located away from sensitive habitats and all faunal impacts for all toll plaza locations (including alternatives) are considered of Low Significance.

The main mitigatory measures involve:

- Ensuring that surface water run-off does not directly enter sensitive habitats (wetlands and forests)
- Provision of suitable fire control measures (e.g. suitable hydrant points, maintenance of fire breaks, bunding of flammable fuel depots)
- High light points should be carefully shielded to ensure efficient lighting in designated areas, but to avoid light pollution into adjacent areas.

With mitigation the faunal impact will have low intensity and significance. All alternatives will cause equal faunal disturbance. As a consequence, the selection between alternative toll plaza locations can be made on non-faunal grounds.

7. DISCUSSION

Faunal diversity along much of the route has already been significantly impacted, particularly by the long history of land use. Loss of faunal diversity attends all human development, and at its root the cause is unchecked human population growth and societal demands for economic growth. Recognition of the unique biodiversity of the Pondoland Centre of Endemism is recent, and it has survived till now by luck, by its lack of ‘traditional’ economic value and by virtue of its protection from fire and livestock grazing due to the exposed Msikaba Sandstone formations. Forest along the sides and bottom of the deeply incised river gorges have survived because of their inaccessibility, not because of proactive conservation measures or provincial or national legislation. Protection of these forest fragments remains piecemeal and subject to economic constraints, and yet they are under increasing threat from

unsustainable extraction of resources, intrusion by repeated man-induced fire, and changes in hydrodynamics attending poor soil management in the surrounding grasslands. For these reasons the “do nothing” alternative will not help the continued decline and impoverishment of faunal diversity in the region.

Construction and operation of the proposed toll road will have diverse environmental impacts on faunal diversity in the region. For the most part these impacts will be negative, local and longterm. It is unlikely that the road will ever be decommisioned and rehabilitated to previous land use. It is likely that it will permanently serve as a transport corridor, and therefore all its impacts can be viewed as being permanent.

Existing road corridors have existed for many years over much of the proposed toll road route, and the greenfield sections (90km) represent only 16.4% of the total route. Most environmental impacts over most of the route will therefore be of low intensity and thus low significance.

Impacts of highest significance would occur in both greenfield sections (summarized in Table 5.1), particularly in the extended route through the Pondoland Centre of Endemism. The greatest impacts will include the loss of sensitive habitats in the Ndwalane to Ntafufu section (4), and the probable loss of Species of Special Concern, particularly the Endangered Cape Griffon Vulture in the Lusikisiki to Mthamvuna River section (6). If the proposed route through Section 4 is undertaken then loss of Sensitive habitat cannot be mitigated and remains of High significance. The impact on species of special concern, particularly the Cape Griffon Vulture, in Section 6 can be mitigated by ensuring that the Msikaba River vulture colony, which is of Regional and National importance, is undisturbed. Proactive mitigation can be achieved by the South African National Roads Agency working with, and supporting, the Vulture Study Group ‘Conservation plan for the Cape Griffon’ (Boshoff and Anderson 2006).

Impacts on Species of Special Concern are best mediated by avoiding and protecting Sensitive Habitats, particularly wetlands and forest patches (see vegetation report) and vulture cliff roosts and breeding sites in the Msikaba River gorge. The state of these habitats should be carefully monitored during the construction and operation of the toll road.

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Table 3.1 Species of Special Concern from the proposed route of the N2 Toll Road

Taxon	Common Name	SA RDB +	Red List + CITES	NEMBA DEAT 2007	Endemic *	Cultural Use Simelane 1996	Presence	Preferred Habitat
INVERTEBRATES								
MOLLUSCA (2)								
Chlamydephorus dimidius			NT **		EC-KZN		Yes	Forest
Chlamydephorus burnupi			NT **		EC-KZN		Yes	Forest
LEPIDOPTERA (3)								
Charaxes pondoensis	Pondo Charaxes	Rare			P		Yes	Forest
Aslauga australis		Rare			EC-KZN		Yes	Forest and thicket
Iolaus (Epamera) aphnaeoides		Rare			EC-KZN		Yes	Forest
HOMOPETRA (2)								
Nyara thanatotica	Nyara cicarda		V**		EC		Yes	Coastal Forest
Stagira pondoensis	Pondo cicada		NT**		P		Yes	Forest fringe
MYRIAPODA (1)								
Patinatius transkeicus	Transkei millipede				EC		Yes	Forest
ARACHNIDA (3)								
Eriauchenius coronatus					EC			Forest Fringe
Afrarchaea haddadi					EC			Forest floor
Afrarchaea woodae					EC			Forest floor
VERTEBRATES								
AMPHIBIA (5)								
Afrixalus spinifrons	Spiny leaf-folding frog	Vulnerable			EC		Yes	Coastal vleis
Leptopelis natalensis	Forest tree frog				EC-KZN		Yes	Forest
Natalobatrachus bonebergi	Kloof frog	Endangered			EC-KZN		Yes	Forest kloofs
Cacosterum striatum	Striped dainty frog				EC-KZN		Possible	Grassland
Pyxicephalus adspersus	Giant Bullfrog	NT		Protected			Possible	Grassland

Table 3.1 Species of Special Concern from the proposed route of the N2 Toll Road (cont)

Taxon	Common Name	SA RDB +	Red List + CITES	NEMBA DEAT 2007	Endemic *	Cultural Use Simelane 1996	Presence	Preferred Habitat
REPTILIA (9)								
Bradypodion kentanicum	Kentani dwarf chameleon	S, Res	Appendix II		EC		Possible	Forest
Bradypodion caffrum	Transkei dwarf chameleon	S, Res	Appendix II		EC-KZN		Yes	Forest
Pesudocordylus microlepidotus	Cape crag lizard	Res.	Appendix II		SA		Possible	Rock outcrops
Acontias plumbeus	Giant legless skink	S			SA		Possible	Forest
Acontias poecilus	Pondoland legless skink	NT**			EC-KZN		Yes	Forest, Grassland
Afroedura pondolia	Pondoland flat gecko	NT**			EC-KZN		Yes	Rock outcrops
Leptotyphlops sylvicolus	Forest thread snake	NT**			EC-KZN		Yes	Forest
AVES (31)								
Gyps coprotheres	Cape Griffon Vulture	Vulnerable, GT	Vulnerable	Endangered	SA	Yes	Yes	Coastal Grassland
Polemaetus bellocosus	Martial Eagle	Vulnerable		Vulnerable		Yes	Yes	Grassland and Savannah
Stephanoaetus coronatus	Crowned Eagle	Near Threatened				Yes	Yes	Forest
Circus ranivorus	African Marsh Harrier	Vulnerable		Protected	SA		Yes	Wetlands
Aviceda cucoloides	Cuckoo Hawk	S	Appendix II				Yes	Forest
Buteo oreophilus	Forest Buzzard	S	Appendix II		SA subspecies		Yes	Forest
Gorsachius leuconotus	Whitebacked Night Heron	Vulnerable					Yes	Mangrove/Estuary
Haematopus moquini	African Black Oystercatcher	GNT	NT		SA		Yes	Coast
Balearica regulorum	Grey Crowned Crane	Vulnerable	NT	Endangered		Yes	Yes	Coastal Grassland
Anthropoides paradiseus	Blue Crane	Vulnerable		Protected	SA near endem	Yes	Possibly	Coastal Grassland
Podica senegalensis	African Finfoot	Vulnerable					Yes	Reed-lined streams
Neotis denhami	Stanley's bustard	Vulnerable, NT		Protected	SA subspecies	Yes	Yes	Coastal Grassland
Vanellus melanopterus	Blackwinged Plover	NNT					Yes	Coastal Grassland
Columba delegorguei	Delegorgue's Pigeon	Vulnerable					Yes	Forest
Turnix hottentotta	Blackrumped Button Quail	Endangered					Yes	Coastal Grassland

Table 3.1 Species of Special Concern from the proposed route of the N2 Toll Road (cont)

Taxon	Common Name	SA RDB +	Red List + CITES	NEMBA DEAT 2007	Endemic *	Cultural Use Simelane 1996	Presence	Preferred Habitat
Caprimulgus natalensis	Natal nightjar	Vulnerable					Yes	Coastal Grassland
Poicephalus robustus	Cape Parrot	Endangered, GE		Critical Endangered	SA		Yes	Forest
Halycon senegaloides	Mangrove Kingfisher	Vulnerable, NT					Yes	Mangrove/Estuary
Alcedo semitorquata	Halfcollared Kingfisher	NNT					Yes	Mangrove/Estuary
Bucorvus leadbeateri	Southern Ground Hornbill	Vulnerable, NT		Protected		Yes	Yes	Forest and Grassland
Glaucidium capense	Cape Barred Owl	S				Yes	Yes	Forest
Tyto capensis	Grass Owl	Vulnerable, NT		Vulnerable		Yes	Yes	Coastal Grassland
Zoothera guttata	Spotted thrush	Endangered, GT	Endangered		SA subspecies		Yes	Forest
Leptoptilos crumeniferus	Maribou Stork	Near Threatened				Yes	Yes	Varied
Mycteria ibis	Yellow-billed Stork	Near Threatened				Yes	Yes	Varied
Sagittarius serpentarius	Secretary Bird	Near Threatened				Yes	Yes	Grassland
Falco peregrinus	Peregrine Falcon	Near Threatened					Yes	Cliffs
Falco biarmicus	Lanner Falcon	Near Threatened					Yes	Cliffs
Vanellus melanopterus	Black-winged plover	Near Threatened					Yes	Grassland
Campethera notata	Knysna woodpecker	Near Threatened	NT		WC and EC		Yes	Forest
Schoenicola brevirostris	Broad-tailed Warbler	Near Threatened					Yes	Rank Grassland
MAMMALIA (8)								
Kerivoula aregentata	Damara Woolly Bat	Endangered				Yes	Yes	Varied
Rhinolophus swinnyi	Swinny's Horseshoe Bat	Endangered				Yes	Yes	Varied
Miniopterus fraterculus	Lesser long-fingered bat	Near Threatened				Yes	Possible	Varied
Miniopterus schreibersii	Schriebers' long-fingered bat	Near Threatened				Yes	Yes	Varied
Myotis tricolor	Temminck's hairy bat	Near Threatened				Yes	Yes	Varied
Rhinolophus capensis	Cape horseshoe bat	Near Threatened				Yes	Possible	Varied
Rhinolophus clivosus	Geoffroy's horseshoe bat	Near Threatened				Yes	Yes	Varied
Kerivoula lanosa	Lesser Woolly bat	Near Threatened				Yes	Possible	Varied
Chrysospalax trevelyani	Giant Golden Mole	Vulnerable	Endangered	Vulnerable	EC		Yes	Forest

Table 3.1 Species of Special Concern from the proposed route of the N2 Toll Road (cont)

Taxon	Common Name	SA RDB +	Red List + CITES	NEMBA DEAT 2007	Endemic *	Cultural Use Simelane 1996	Presence	Preferred Habitat
Orycteropus afra	Aardvark					Yes	Yes	Coastal Grassland
Mystromys albicaudatus	White-tailed rat	Endangered					Possible	Grassland
Mellivora capensis	Honey badger	Near Threatened	Appendix III	Protected		Yes	Probable	Varied
Felis lybica	African wild cat		Appendix II				Possible	Varied
Felis serval	Serval	Near Threatened	Appendix II	Protected			Yes	Forest and Grassland
Otolemur crassicaudatus	Thick-tailed bushbaby		Appendix II			Yes	Yes	Forest
Cercopithicus mitis	Samango Monkey	Endangered	Appendix II	Vulnerable			Yes	Forest
Dendrohyrax arboreus	Tree Hyrax	Vulnerable		Vulnerable			Yes	Forest
Aonyx capensis	Cape Clawless Otter			Protected		Yes	Yes	Rivers
Ourebia ourebi	Oribi	Endangered		Endangered		Yes	Yes	Coastal Grassland
Cephalophus monticola	Blue Duiker	Vulnerable	Appendix II	Vulnerable		Yes	Yes	Forest
Totals	71	61	21	18	33	26		

+ South African Red Data Books (birds, Barnes, 2000; mammals, Fieldmann and Daly 2004; reptiles, Branch 1988; amphibians Minter et al 2004; butterflies, Henning and Henning, 1989)

IBA = Important Bird Areas of Southern Africa, Barnes 1998; GE = Globally Endangered; GT = Globally Threatened; GNT, = Globally Near Threatened; NT = National Threatened

NNT = Nationally Near Threatened; ** = Not yet ratified, but probable assessment based on RD criteria; S = Sensitive

* 75% occurrence; for birds includes disjunct subspecies; SA = South Africa (+ Lesotho); EC = Eastern Cape; KZM = KwaZulu-Natal; P = Pondoland region

PROPOSED N2 WILD COAST TOLL HIGHWAY: ENVIRONMENTAL IMPACT ASSESSMENT

EXTERNAL REVIEW OF DRAFT SPECIALIST FAUNA REPORT

P. le F. N. Mouton

The report was reviewed in terms of the Terms of Reference provided.

1. Assess whether the specialist study has complied with its Terms of Reference.

In general, the specialist fauna study has complied with its Terms of Reference, but there are a few areas of uncertainty:

1. Mention is made of a site visit, but no details are provided.
2. It is expected that the study should identify ways to ensure that recommended mitigation measures would be implemented, as appropriate. It is repeatedly mentioned in the report that sensitive areas, i.e. wetlands, forest patches, etc, should be avoided, but exactly where are these areas? There needs to be some cross-reference to the vegetation and fresh water studies?
3. It is proposed that bird mortality at bridges be regularly monitored. It is also proposed that numbers of road mortalities and disturbance to migratory species (e.g. frogs) and those that cover wide areas in their normal foraging (e.g. vultures) be monitored. No specific details of a monitoring plan are however provided.

2. Assess whether adequate consideration is given, where appropriate, to the legal, policy, and/or planning context of direct relevance to the specialist study.

Legal and policy aspects are adequately covered by the report.

3. Assess the study approach, technical content and assessment methodology of the specialist study to determine whether it is credible.

The study is mainly a desktop one, which is the only logical way of dealing with a project of this magnitude. Dividing the route into sections and treating each section separately helped considerably to simplify descriptions. In general, the study is of a very high quality and the data and arguments presented highly credible. There are, however, a number of issues that need to be addressed (for the benefit of the author, style and grammatical issues are listed in an addendum).

1. Impact 5 –Threats to faunal movements. Discussion the possible impact of the proposed highway on migratory birds under this heading creates confusion. It gives the impression that the highway, as in the case of other animal groups, may act as a physical barrier to movement, which clearly cannot be true for birds. Unless the concern is that powerlines associated with the toll road may impact on migratory birds? Surely the construction of powerlines along the new road sections is a separate issue requiring a separate EIA? If the impact on migratory birds is through loss of over-wintering habitat, then it would be best to discuss this issue under Impacts 1 or 2. In any event, an opening paragraph is needed to put the migratory bird issue in perspective.

2. Map: The inclusion of a generalized map showing the current road system and the proposed highway would have made it much easier to follow the descriptions of possible impacts. In section 6.3 (Alternative Route Alignments) the author refers to Maps1-10; these maps should either be included in the document or full reference should be given where they can be consulted.

3. Impact ratings: In the evaluation sections for all the potential impacts the reader should be referred to Tables 5.1-5.7. As is, the reader will not realize that all the information for the different road sections is summarized in Tables and will find the evaluation descriptions vague, inconclusive and inconsistent in terms of the significance rating criteria outlined in Table 2.2.

4. Mitigation: For some of the evaluations, possible mitigation measures are provided in bullet form, for others not. As mitigation is an important issue it is recommended that it is discussed under a separate subheading for each impact.

4. Assess the adequacy of information used, and identify whether there are any obvious information gaps, omissions or inaccuracies which need to be addressed

The study is very comprehensive and there are no notable information gaps. The following reference may also be considered for RDB butterflies: Ball, J.B. 2005. Approaches towards a critical evaluation and update of the Red Data List of South African butterflies. Unpublished MSc thesis, University of Stellenbosch, South Africa.

5. Assess whether the significance ratings given to potential impacts are reasonable and reliable

Significance ratings as summarized in Tables 5.1-5.7 are highly inconsistent with regard to the rating criteria listed in Table 2.2. In several cases, notably in Tables 5.4-5.6, the significance rating given is incorrect. This is a major concern:

- In Table 5.4 the operation phase ratings should all be low instead of medium. Significance with mitigation should likewise be changed.
- In Table 5.5 Impact 2 (operation phase) should be of medium significance and Impact 4 (construction phase) of low significance.
- In Table 5.6 not one of the high significance ratings is in accordance with the rating criteria.

These inconsistencies make it impossible to evaluate the given ratings at this stage, specially the medium and high ratings as it is uncertain whether the author will keep the significance ratings and change the rating scales, or, on the other hand, keep the rating scales and change the ratings. I agree with the ratings given for the other road sections, i.e. for sections 1-3 and 7.

As mentioned previously, the evaluation (rating) descriptions of impacts (pp 35-48) may, in the absence of proper reference to Tables 5.1-5.7, appear vague and inconsistent in terms of the rating criteria.

6. Assess whether the recommendations of the study with regard to the most appropriate alternatives are sound and defensible Alternative route alignments are discussed in adequate detail in the report.

Provision of relevant maps showing these alternatives would have made the review process easier. Sound recommendations are provided.

7. State any alternative viewpoints concerning the issues presented in the report, if any, giving explicit reasons for your particular stance

It is not clear why roads should affect bird movement. The author should explain in more detail why roads can affect bird movement.

8. State whether you believe that any key uncertainties or risks, and/or assumptions underpinning the assessment, have been sufficiently highlighted in the study

Uncertainties and assumptions have been sufficiently highlighted in the report.

Prof P. le F.N.Mouton
15 February 2008

REVIEWER'S COMMENTS	RESPONSE
1.1 Mention is made of a site visit, but no details are provided.	Included.
1.2 It is expected that the study should identify ways to ensure that recommended mitigation measures would be implemented, as appropriate. It is repeatedly mentioned in the report that sensitive areas, i.e. wetlands, forest patches, etc, should be avoided, but exactly where are these areas? There needs to be some cross-reference to the vegetation and fresh water studies?	Cross-reference to vegetation report is made. Details of monitoring plans should form part of the Environmental Management Plan.
1.3 It is proposed that bird mortality at bridges be regularly monitored. It is also proposed that numbers of road mortalities and disturbance to migratory species (e.g. frogs) and those that cover wide areas in their normal foraging (e.g. vultures) be monitored. No specific details of a monitoring plan are however provided.	Details of monitoring plans should form part of the Environmental Management Plan.
3.1 Impact 5 – Threats to faunal movements. Discussion of the possible impact of the proposed highway on migratory birds under this heading creates confusion. It gives the impression that the highway, as in the case of other animal groups, may act as a physical barrier to movement, which clearly cannot be true for birds.	The movement of certain bird groups may be impacted by the presence of a road. The question is not whether birds are capable of crossing roads, but whether they choose to. Impacts arise directly, via increased mortalities from road traffic, and also indirectly from disturbance and behavioural reluctance to cross alien habitat See reviews in Reijen and Foppen (1994) and Reijen et al. (1995, 1997) for impacts on bird movements, both of which are discussed in the text.
3.2 Maps	Reference to maps in other reports is included.
5. Significance ratings as summarized in Tables 5.1-5.7 are highly inconsistent. with regard to the rating criteria listed in Table 2.2. In several cases, notably in Tables 5.4-5.6, the significance rating given is incorrect. This is a major concern: □ In Table 5.4 the operation phase ratings should all be low instead of medium. Significance with mitigation should likewise be changed. □ In Table 5.5 Impact 2 (operation phase) should be of medium significance and Impact 4 (construction phase) of low significance	Tables 5.4 – 5.6 cover impacts arising in the 'greenfields' sections of the road – those sections most likely to be the most environmentally sensitive. I disagree. Loss of habitat (Impact 1) will occur mainly during the construction phase (operational impact Low). However, all other impacts will continue to operate during the operational phase, where their total impact over the life of the project (effectively permanent) will continue and probably exceed the impact inflicted during the short construction phase. Impact 2 (OP) I agree and have changed accordingly Impact 4 (CP) I disagree: Increased activity during construction, within the gorge and adjacent regions are likely to cause greater disturbance to the colony than during the operational phase. This is the rational for the mitigation measures designed to

significance. □ In Table 5.6 not one of the high significance ratings is in accordance with the rating criteria.	reduce disturbance during this phase. Three impacts are rated as of High significance during both the construction and operational phase (Impact 3 – loss of SSC; Impact 4 – impacts on Cape Griffon Vulture; Impact 9 – Noise and Light pollution The assessments hinge on the perceived levels of Intensity, area of extent, and duration, using the following criteria: Impacts could be: EITHER of **high intensity** at a **regional level** and endure in the **medium term**; OR of **high intensity** at a **national level** in the **short term**; OR of **medium intensity** at a **national level** in the **medium term**; OR of **low intensity** at a **national level** in the **long term**; OR of **high intensity** at a **local level** in the **long term**; OR of **medium intensity** at a **regional level** in the **long term.** The loss of endemic or Nationally/Globally threatened species (e.g. SSC and Cape Griffon Vultures) during the construction and operational phases may occur. The impact is local (site specific) but would have regional or even national significance if it causes the loss of a significant part of the species concerned. Loss of any endemic or threatened specie (e.g. Cape Griffon Vulture and others listed in Table 3.1) may have national or regional significance (criteria 2 when occurring at high intensity over the short term for the construction phase 4, when occurring at low intensity over the long term for the operational phase). With mitigation the significance of Impacts 3 and 4 can be reduced (as indicated in Table 5.6). I consider the original ratings for Impacts 3 and 4 accurate Impact 9 (Noise and Light pollution) cannot be easily mitigated and will occur with medium intensity over the long term (operation), or high intensity in he short term (construction). The significance has been reduced to Medium.
7. It is not clear why roads should affect bird movement. The author should explain in more detail why roads can affect bird movement.	This point is discussed above (see point 3.1).