

**THE PROPOSED N21 (R300) CAPE TOWN RING ROAD TOLL
PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT: ENTOMOLOGY**

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**R300 EXTENSION/N21 CAPE TOWN RING ROAD TOLL PROJECT – ENVIRONMENTAL
IMPACT ASSESSMENT: ENTOMOLOGY**

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R300 EXTENSION/N21 CAPE TOWN RING ROAD TOLL PROJECT – ENVIRONMENTAL IMPACT ASSESSMENT: ENTOMOLOGY

1. INTRODUCTION

The terms of reference for this specialist study are to:

- Identify areas and habitats significant to the conservation of insect species of special interest (e.g. rare butterflies). (A comment was received that a rare butterfly occurs in the strandveld vegetation at the coast between Muizenberg and Mitchells Plain)
- Make recommendations towards avoiding or mitigation of potential impacts, whether related to route alignment, road design, construction or operation, including recommendations regarding post construction rehabilitation.
- Identify from the existing impact assessment reports any possible cumulative impacts that the construction of the Cape Flats Freeway Extension in conjunction with the R300/N21 would have on insects of special interest.
- Assess the road design to ensure implementation of recommendations or concerns. This would be in the form of both desktop assessment and a workshop with the engineers and other specialists.
- Provide a detailed description of construction phase mitigation requirements/recommendations and rehabilitation requirements for inclusion into the construction phase management plan.

Insects are particularly suited for use in environmental impact assessment because of their high species diversity and role in the functioning of ecosystems (Rosenberg *et al.*, 1986)

Although tasked with a report on insects, the main emphasis in this report is on butterflies. Reasons for this emphasis include the availability of authoritative sources of information, published and otherwise, of these insects, a general acceptance of butterflies as environmental indicators by scientists (although much work still needs to be done to prove such acceptance) and the positive attitude and perception (“charismatic”) to butterflies, rather than insects in general, by the lay public. That insects other than butterflies will also be affected during the construction and operational stages of the planned road is undeniable. However, most insects possess the ability to fly, enabling them to disperse away from temporary disturbances, but are as quick to re-colonise habitats. Insects with sedentary habits will be negatively affected by various activities during road building. However, it is doubted whether such insects are in fact confined to the area under discussion.

Some 49 species of butterflies (See Appendix) are found in close association with and proximity to the habitats traversed by the proposed Cape Town Ring Toll Road. These habitats range from moderately disturbed vleilands (Sector 1, sections 1 - 2), extremely disturbed habitats, including build-up urban areas and agricultural fields (Sectors 2 - 3, sections 3 – 7) and to moderately disturbed Sandveld vegetation (Sector 3, section 8). Each of these sections has, in conjunction with the flora, its own typical composition of butterfly faunas. The majority of species to be found are in sections 1, 2, 7 and 8, representing habitats least disturbed. In many cases the butterflies listed also occur in other parts of the country, especially elsewhere in the Western Cape.

Most of the listed butterflies are common throughout the Cape Peninsula. Several species of butterflies restrict themselves to specific habitats, while others are more generally distributed, even they may prefer certain spots. Some species venture from their natural habitats into adjacent build-up areas. Many of these are less selective in their choice of food-plants and many of the latter are often found in gardens where they are able to maintain themselves.

Fragmentation of the natural habitats in the greater Cape Peninsula is a serious threat to many species and the proposed road will lead to further fragmentation. Correctly managed road verges, however, can provide corridors, especially for insects capable of flying, between the isolated fragments of natural habitat. Roads as line corridors can cause high traffic mortality to insects, but from the conservation point of view line corridors are often extremely important linear patches relative to the insect's home ranges and in directing movement. The insect biomass of such corridors is encouragement to their vertebrate predators, which in turn may be of conservation value (Samways, 1994).

In this report each section of the proposed ring road is assessed for possible impacts on butterfly species expected or confirmed to occur for that particular sector. Some of the mitigation measures proposed are generic and are also repeated in the other specialists' reports. Other measures are broadly defined due to the fact that detailed design of the proposed road will only be done at a later stage.

2. METHODS

Checklists of the butterfly fauna expected or known to occur along the various sectors of the proposed R300 extension were compiled by making use of published literature (See Appendix) and by studying some private local collections of butterflies. Site visits were undertaken on 12 March, 22 March, 27 March and 2 April, 2002.

Distribution records, published or otherwise, of insects are generally fairly vague, usually giving the nearest town as localities. Such localities are thus considerably less accurate than the scale required for a study of this nature. From own experience and in consultation with local butterfly experts a definite checklist could be compiled. This report has also been discussed at length with Dr J Ball and Mr T Brinkman, both well-known specialists on the local butterfly fauna. Talks were also held on 19 April 2002 with Mr D Gibbs and C Dorse, managers of the Rondevlei Nature Reserve and Zandvlei Nature Reserve, respectively.

A literature search to assess best practices for the conservation and management of insects, including butterflies, was surprisingly scant, and absent in the South African context. However, the central place of butterflies in promoting conservation awareness of other invertebrate animals is reflected strongly in recent texts on insect conservation and invertebrate conservation (Samways, 1994; New, 1995).

2.1 Literature review:

Although road traffic is known to affect population densities of many vertebrate animals, practically nothing is known about the impact that roads have on invertebrates (Seibert & Conover, 1991). In fact, a recent book on butterfly conservation (New, 1997) makes no mention of the subject, and roads are mentioned only briefly in two other recent books on insect conservation, as barriers to butterfly movement (Samways, 1994; Pullin, 1995). Samways (1994) states "Roads are line corridors that can cause high mortality where traffic volume is high. In 1989, 100 m of Tennessee roadside was a graveyard for over 120 traffic-killed butterflies" (Samways, 1994: 117). Other than these sources, the best information on road mortality of

butterflies is by Manguira and Thomas (1992) in England. They found that roads were not a serious barrier to butterfly movement, but that vehicles killed up to 7% of adult butterflies from some populations. More recently, the magnitude of road mortality of Lepidoptera (butterflies and moths) was investigated in central Illinois (McKenna *et al.*, 2001). Traffic rates of 1000, 13 500 and 19 700 vehicles per day were studied as to their effect on mortality of Lepidoptera. These researchers found that the number of Lepidoptera killed along roadways for the entire state of Illinois during one week was estimated at more than 20 million individuals. Their results also suggest that increases in traffic rate and speed limit may to a certain extent increase mortality. However, at speeds of about 80 km/h or greater, the insects were caught in the wind stream over the roof of the car and less were found to be killed by such traffic. It should also be emphasized that this study was carried out during the high season of butterfly activity. No such studies have been done in Africa as yet.

2.2 Issues at stake in Sector 1:

This topic is suitably addressed and discussed in the (bird) report by Dave Pepler, especially his particular views on the sterling work done at the Rondevlei and Zandvlei Nature Reserves in regard to their activities at enhancement of nature conservation issues concerning environmental, educational and social responsibilities.

3. RESULTS

Five butterfly families are known from the region under discussion: Nymphalidae: Danainae (1 species), Satyrinae (7 species), Acraeinae (1 species), Nymphalinae (1 species); Lycaenidae (21 species); Papilionidae (1 species); Pieridae (5 species, including one introduced European species); and HesperIIDae (12 species). Some other species are on occasion reported as migrants to this region, but as they are not endemic are not considered to be relevant in this report.

The various species of butterflies are listed in the Appendix in which the habits, seasonal occurrence and food-plants of each species are briefly discussed. For ease of reference, numbers as given in *Pennington's Butterflies*, the standard work on South African butterflies, is given for each species listed. Furthermore, all species are illustrated (Plates 1 and 2), while their absence or presence in sectors 1 - 8 is given in Table 1. The larvae of butterflies feed on plants and their food-plant associations are thus of great importance. Some localised species breed only on certain indigenous plants and in only a few cases, for example *Anthene definita* and *Lampides boeticus*) are also able to feed on some cultivated plants and crops. To facilitate linkage with the report on the flora, an alphabetical list of known food-plants for each species of butterfly is given in Table 2. The Appendix finally lists the literature consulted.

CONSERVATION STATUS

Red data species: None of the butterflies listed are either **endangered**, **vulnerable** or considered **rare**. *Kedestes barberae bunta*, found close to sector 1, section 2 of the planned road, may be **threatened**.

Nature Conservation Ordinance, 1974 (Ordinance 19 of 1974 of the Province of the Cape of Good Hope): None of the 49 butterfly species listed has been proclaimed a **scheduled** species.

SECTOR 1: SOUTHERN GREENFIELDS

This sector is the most critical sector in terms of the biophysical environment and ecological integrity. The alignment of the proposed road traverses some important wetlands and proclaimed nature reserves, including that of the envisaged False Bay Coastal Park.

Steenberg Road towards Vanguard Drive: South of the initial stretch between Main Road and Prince George Drive the Strandveld vegetation, fairly free from aliens, supports 43 of the listed 49 species of butterflies (Table 1, section 1); many of these butterflies also occur in gardens in the build-up areas north of this stretch. Natural food-plants of butterflies present include many grass species, such as *Imperata cylindrica* (Table 2). The butterfly *Kedestes lenis* is restricted to the road reserve itself.

Beyond Prince George Drive towards and up to Strandfontein Road, south of Zeekoevlei and north of the Strandfontein Sewerage Works, the Strandveld vegetation appears impoverished and contains much alien vegetation. Nevertheless, 43 of the listed 49 species of butterflies are found, or expected to be found, in this stretch (Table 1, section 2). Of the 43, *Mylothris agathina* is now absent, but *Kedestes barbarea bunta* as well as *K. lenis* are present. *K. barbarea bunta* is a butterfly with an extremely restricted habitat and is confined to an area south of the proposed road. Its habitat is severely threatened by the invasion of alien vegetation and frequent fires.

The stretch beyond Strandfontein Road towards Vanguard Drive Interchange traverses urban and farming areas, with little natural vegetation remaining. The reduction of suitable natural food-plants is mirrored by the reduced presence of butterflies, the same 28 of the 49 species expected as listed for section 3 (Table 1, section 3). All these butterflies are fairly common all along the route of the proposed road. Many, if not most, butterflies are able to utilise as suitable food-plants various cultivated exotics, weeds and grasses (Table 2) found along and adjoining this part of the route.

Anticipated Impact

The main concern regarding this sector is the threat posed to the local population of *Kedestes lenis* and its habitat in section 1. Its food-plant is *Imperata cylindrica*. This grass is fairly common and it is envisaged that subsequent to the completion of this section of the intended road, it will re-establish itself along the road verge and serve as food-plant of *K. lenis* once more. Furthermore, the road verge will be protected by a fence which will provide a fairly stable habitat.

Significance of impact

The expected impacts would be localized within the site boundaries. (L)

- (a) The expected duration of the impacts will be short term, quickly reversible and less than the project life. (L)
- (b) It is expected that the impacts will cause minor changes in the habitat diversity, with little deterioration of habitat quality. (L-)
- (c) There is a low likelihood of the impacts having a negative effect. (L)
- (d) The expected impact will be negative on *Kedestes lenis*.

(e) Consequence

Intensity = L				
Duration	H			
	M			Medium
	L	Low	X	
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
		L	M	H
Extent				

(f) Significance:

Significance				
Probability	H	Medium		High
	M			
	L	Low	X	Medium
		L	M	H
Consequence				

- (g) It can be predicted with a fair degree of confidence that the expected negative impacts will not be permanent.
- (h) There are no specific legal or permit requirements relevant to this project.
- (i) The expected impacts of the proposed project are not likely to affect the project decision.

Mitigation measures/recommendations

- (a) During the construction phase of section 1 measures should be taken to limit physical damage to the minimum area by fencing off areas of importance and by enforcement by the Environmental Site Officer (ESO).
- (b) Storage of road-building equipment, fuel and building materials should be limited to certain areas as indicated and controlled by the ESO.

- (c) Location of access roads, borrow pits and quarries should be critically selected to limit damage to the environment.
- (d) An ESO should be appointed for the duration of the construction and rehabilitation phases of the project and subsequent maintenance of the road to ensure compliance with the environmental prescriptions, concerns and recommendations.
- (e) Regular environmental training should be provided to construction workers during the construction and operational phases to ensure protection and maintenance of wild life.
- (f) The re-establishment of indigenous vegetation, especially *Imperata cylindrica* (food-plant of *Kedestes lenis*) for rehabilitation of the road verges should be undertaken. Exotic vegetation, refuse dumping and usage of all pesticides should not be allowed, unless for the control of alien and invasive weeds. Prescribed burning of the road verges to create areas of uneven aged vegetation should be promoted towards the creation of a mosaic of habitats.
- (g) A survey as to the presence or absence of *K. lenis*, in conjunction with its food-plant, should be carried out after the completion of the construction phase of the road. If the food-plant and/or butterfly is found to be absent along the verge of section 1, re-establishment of the food-plant and butterfly from the populations present between the area south of the proposed road and north of Pelican Park, is to be considered.

	Extent	Duration	Intensity	Status	Significance	Confidence	Probability
Without Mitigation	Low, but High on first two sections *	Limited	Limited	High*, but Low otherwise	High*, but Low otherwise	95%	95%
With Mitigation	Low	Limited	Limited	Low	Low	95%	95%

- Two scarce butterflies are concerned: *Kedestes lenis* is confined to the first section and *K. barbarae bunta* and *K. lenis* present along the second section of sector 1: Southern Greenfields

SECTOR 2: EXISTING N21/R300

This established road, between the Swartklip Interchange on the N1 to Wellington Road in Durbanville, traverses mainly urban and build-up areas and contains very little undisturbed original vegetation. The reduction in suitable food-plants corresponds with that of the number of species of butterflies. 28 Species of butterflies are expected along section 3, and 27 species of the total of 49 species along sections 4 and 5 (Table 1, sections 3 – 5). All species of butterflies, except *Pelopidas thrax inconspicua*, are present along the entire length of the existing road.

Anticipated Impact

All listed butterflies are fairly common and are found along the entire length of the planned and existing Ring Road (Table 1). Most, if not all, are able to maintain themselves by utilising suitable food-plants in adjoining suburban gardens and along the road verges.

Significance of impact

The expected impacts would be localized within the site boundaries. (L)

- (a) The expected duration of the impacts will be short term, quickly reversible and less than the project life. (L)
- (b) It is expected that the impacts will cause minor changes in the habitat diversity, with little deterioration of habitat quality. (L-)
- (c) There is a low likelihood of the impacts having a negative effect. (L)
- (d) The expected impact will be neutral.
- (e) Consequence

Intensity = L				
Duration	H			
	M			Medium
	L	Low	X	
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
		L	M	H
Extent				

(f) Significance:

Significance				
Probability	H	Medium		High
	M			
	L	Low	X	Medium
		L	M	H
Consequence				

- (g) It can be predicted with a fair degree of confidence that the expected negative impacts will not be permanent.
- (h) There are no specific legal or permit requirements relevant to this project.
- (i) The expected impacts of the proposed project are not likely to affect the project decision.

Mitigation measures/recommendations

- (a) No specific action will be required along this sector. Widening the road may displace the species for some time, but with the re-establishment of verge vegetation and completion of construction activities, will ensure their return.
- (b) During the construction (fencing, possible road-widening) phase of section 2 measures should be taken to limit physical damage to the minimum area by fencing off areas of importance and enforcement by the Environmental Site Officer (ESO).
- (c) Storage of road-building equipment, fuel and building materials should be limited to certain areas as indicated and controlled by the ESO.
- (d) Location of access roads, borrow pits and quarries should be critically selected to limit damage to the environment.
- (e) An ESO should be appointed for the duration of the construction and rehabilitation phases of the project and subsequent maintenance of the road to ensure compliance with the environmental prescriptions, concerns and recommendations.
- (f) Regular environmental training should be provided to construction workers during the construction and operational phases to ensure protection and maintenance of wild life.
- (g) The re-establishment of indigenous vegetation for rehabilitation of the road verges should be undertaken. Exotic vegetation, refuse dumping and usage of all pesticides should not be allowed, unless for the control of alien and invasive weeds. Prescribed burning of the road verges to create areas of uneven aged vegetation should be promoted towards the creation of a mosaic of habitats.

	Extent	Duration	Intensity	Status	Significance	Confidence	Probability
Without Mitigation	Low	Limited	Limited	Low	Low	95%	95%
With Mitigation	Low	Limited	Limited	Low	Low	95%	95%

SECTOR 3: NORTHERN GREENFIELDS

Section 6 passes through established residential areas. The road reserve is fairly wide and many suitable food-plants, especially grasses, are present. As expected, all of the 27 butterfly species listed (Table 1, section 6) are found all along the established as well as proposed part of the entire road. Many suitable host-plants for these insects are also provided in the adjoining suburban gardens.

In section 7 the planned route runs along an area that has been disturbed for a considerable time by intense farming activities. However, in this area natural renosterveld vegetation occurs in patches. The streams and rivers contain riverine vegetation, in places invaded by exotic Acacias. Many of these patches of suitable habitats form important corridors for many animals, including insects. This greater diversity in suitable habitats and vegetation is also reflected by the higher number of butterfly species (43 of a total of 49)(Table 1, section 7) which are known from this section.

Section 8 traverses vegetation characterised as Sand Plain Fynbos, although it is in places fairly disturbed. Towards the and across the West Coast Road (R27) the vegetation changes into Strandveld and Dune Thicket mosaic. Much of this area is invaded by the exotic *Acacia cyclops*. In this section the same 43 species of butterflies as found in section 7 are present (Table 1, section 8).

Anticipated Impact

All of the 27 listed butterflies are found not only in section 6, but also along the entire route. No permanent impact on their presence is expected as their numbers along the proposed road in this section are in any case rather low. Construction of the road in sections 7 and 8 will have little impact on the diversity and numbers of butterfly species. Section 7, although fairly disturbed, provides sufficient habitats in close proximity to the planned road for the survival and maintenance of populations of various insects, including butterflies. The area adjoining the planned route in section 8 is fairly extensive and it is not foreseen that either construction or operation of this section will impact negatively on any insect found in this section. Part of the planned route in this sector traverses wetland areas. Such wetlands are valuable environmental resources and may harbour many species of plants and animals interacting with each other. Many water-living insects provide food for other animals, such as amphibians or feed on other insects, e.g. dragonflies. Little is known about the diversity of these insects.

Significance of impact

The expected impacts would be localized within the site boundaries. (L)

- (a) The expected duration of the impacts will be short term, quickly reversible and less than the project life. (L)
- (b) It is expected that the impacts will cause minor changes in the present habitat diversity, with little deterioration of habitat quality. (L+)
- (c) There is a low likelihood of the impacts having a negative effect. (L)
- (d) The probability of the impacts occurring would be low. (L)
- (e) The expected impact will be neutral.
- (f) Consequence

Intensity = L				
Duration	H			
	M			Medium

	L	Low X		
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
	L		M	H
Extent				

(f) Significance:

Significance				
Probability	H	Medium		High
	M			
	L	Low X		Medium
	L		M	H
Consequence				

- (g) It can be predicted with a fair degree of confidence that the expected impacts will not be negative.
- (h) There are no specific legal or permit requirements relevant to this sector.
- (i) The expected impacts of the proposed project are not likely to affect the project decision.

Mitigation measures/recommendations

- (a) No specific action will be required along this sector, except for the parts crossing wetlands. Widening the road along section 6 may displace the species for some time, but with the re-establishment of verge vegetation and completion of construction activities, will ensure their return. Reclamation of part of the agricultural land along section 7 may increase the availability of additional habitats, especially of many grass species, along the road verge, to the benefit of the insects that can make use of such habitats. Conservation of wetland habitats should, however, be attempted by construction of bridges and prevention of unnatural sedimentation into such wetlands.

- (b) During the construction phase of sector 3 measures should be taken to limit physical damage to the minimum area by fencing off areas of importance and enforcement by the Environmental Site Officer (ESO).
- (c) Storage of road-building equipment, fuel and building materials should be limited to certain areas as indicated and controlled by the ESO.
- (d) Location of access roads, borrow pits and quarries should be critically selected to limit damage to the environment.
- (e) An ESO should be appointed for the duration of the construction and rehabilitation phases of the project and subsequent maintenance of the road to ensure compliance with the environmental prescriptions, concerns and recommendations.
- (f) Regular environmental training should be provided to construction workers during the construction and operational phases to ensure protection and maintenance of wild life.
- (g) The re-establishment of indigenous vegetation for rehabilitation of the road verges should be undertaken. Exotic vegetation, refuse dumping and usage of all pesticides should not be allowed, unless for the control of alien and invasive weeds. Prescribed burning of the road verges to create areas of uneven aged vegetation should be promoted towards the creation of a mosaic of habitats.

	Extent	Duration	Intensity	Status	Significance	Confidence	Probability
Without Mitigation	Low	Limited	Limited	Low	Low	95%	95%
With Mitigation	Low	Limited	Limited	Low	Low	95%	95%

SECTOR 4: STELLENBERG INTERCHANGE

Section 9 will entail the construction of an elevated highway in an urban area. The butterflies listed for section 6 will also be present here. Their diversity and numbers are very low and very little impact is expected on their presence and survival.

Anticipated Impact

No impact of any significance is expected during and in this stage of the development.

Significance of impact

The expected impacts would be localized within the site boundaries. (L)

- (a) The expected duration of the impacts will be short term, quickly reversible and less than the project life. (L)
- (b) It is expected that the impacts will cause minor changes in the habitat diversity, with little deterioration of habitat quality. (L-)
- (c) There is a low likelihood of the impacts having a negative effect. (L)

- (d) The expected impact will be negative or neutral.
- (e) Consequence

Intensity = L				
Duration	H			
	M			Medium
	L	Low	X	
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
		L	M	H
Extent				

- (f) Significance:

Significance				
Probability	H	Medium		High
	M			
	L	Low	X	Medium
		L	M	H
Consequence				

- (g) It can be predicted with a fair degree of confidence that the expected negative impacts will not be permanent.
- (h) There are no specific legal or permit requirements relevant to this project.
- (i) The expected impacts of the proposed project are not likely to affect the project decision.

Mitigation measures/recommendations

- (a) During the construction phase measures should be taken to limit physical damage to the minimum area by fencing off areas of importance and enforcement by the Environmental Site Officer (ESO).

- (b) Storage of road-building equipment, fuel and building materials should be limited to certain areas as indicated and controlled by the ESO.
- (c) Location of access roads, borrow pits and quarries should be critically selected to limit damage to the environment.
- (d) An ESO should be appointed for the duration of the construction and rehabilitation phases of the project and subsequent maintenance of the road to ensure compliance with the environmental prescriptions, concerns and recommendations.
- (e) Regular environmental training should be provided to construction workers during the construction and operational phases to ensure protection and maintenance of wild life.
- (f) The re-establishment of indigenous vegetation for rehabilitation of the road verges should be undertaken. Exotic vegetation, refuse dumping and usage of all pesticides should not be allowed, unless for the control of alien and invasive weeds. Prescribed burning of the road verges to create areas of uneven aged vegetation should be promoted towards the creation of a mosaic of habitats.

	Extent	Duration	Intensity	Status	Significance	Confidence	Probability
Without Mitigation	Low	Limited	Limited	Low	Low	95%	95%
With Mitigation	Low	Limited	Limited	Low	Low	95%	95%

SECTOR 5: PHILIPPI LINK

Sector 5 (section 10) provides for an alternative route north of Grassy Park and Philippi Extension. These areas are highly urbanized with very little, if any, natural vegetation left. In view of the comments made for Sector 1 (sections 1 and 2) this alternative route would be desirable in respect of the maintenance of the habitat of *Kedestes lenis*. Practical implications of re-routing would be a decisive factor.

Anticipated Impact

Very limited as hardly any natural vegetation is left.

Significance of impact

The expected impacts would be localized within the site boundaries. (L)

- (a) The expected duration of the impacts will be short term, quickly reversible and less than the project life. (L)
- (b) It is expected that the impacts will cause minor changes in the habitat diversity, with little deterioration of habitat quality. (L-)
- (c) There is a low likelihood of the impacts having a negative effect. (L)
- (d) The expected impact will be negative

(e) Consequence

Intensity = L				
Duration	H			
	M			Medium
	L	Low	X	
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
		L	M	H
Extent				

(f) Significance:

Significance				
Probability	H	Medium		High
	M			
	L	Low	X	Medium
		L	M	H
Consequence				

- (g) It can be predicted with a fair degree of confidence that the expected negative impacts will be temporary.
- (h) There are no specific legal or permit requirements relevant to this project.
- (i) The expected impacts of the proposed project are not likely to affect the project decision.

Mitigation measures/recommendations

- (a) During the construction phase of this sector measures should be taken to limit physical damage to the minimum area by fencing off areas of importance and enforcement by the Environmental Site Officer (ESO).
- (b) Storage of road-building equipment, fuel and building materials should be limited to certain areas as indicated and controlled by the ESO.
- (c) Location of access roads, borrow pits and quarries should be critically selected to limit damage to the environment.
- (d) An ESO should be appointed for the duration of the construction and rehabilitation phases of the project and subsequent maintenance of the road to ensure compliance with the environmental prescriptions, concerns and recommendations.
- (e) Regular environmental training should be provided to construction workers during the construction and operational phases to ensure protection and maintenance of wild life.
- (f) The re-establishment of indigenous vegetation for rehabilitation of the road verges should be undertaken. Exotic vegetation, refuse dumping and usage of all pesticides should not be allowed, unless for the control of alien and invasive weeds. Prescribed burning of the road verges to create areas of uneven aged vegetation should be promoted towards the creation of a mosaic of habitats.

	Extent	Duration	Intensity	Status	Significance	Confidence	Probability
Without Mitigation	Low	Limited	Limited	Low	Low	95%	95%
With Mitigation	Low	Limited	Limited	Low	Low	95%	95%

4. STATEMENT ON THE AFFECTED ENVIRONMENT CONCERNING THE N21/R 300 CAPE TOWN RING TOLL ROAD

From the environmental point of view, sector 1 (sections 1 and 2) and sector 3 (sections 7 and 8) are the most sensitive to disturbance by the impending construction and operation of the road. These sections of the road will traverse areas containing fairly large parts of natural vegetation with their associated invertebrate faunas. A total of 49 species of butterflies have been recorded as being present along the proposed route, some sectors, with least disturbed vegetation, have 43 of these 49 species present, while in other sectors passing through urbanized areas, the numbers range from 28 to 26 species. Most of the planned road passes through urban areas. Urban sprawl has destroyed considerable amounts of prime invertebrate habitat. This includes activity of urban humans such as grass-cutting, clearing of natural vegetation, application of herbicides and insecticides and replacement of native vegetation by exotic garden plants. These actions restrict both the spectrum of resources available to insects and their immature stages and the period during which these resources are available.

From the entomological point of view, the insect communities in sector 1 (sections 1 and 2) and sector 3 (sections 7 and 8) deserve special attention, not only because of the highest number of species of butterflies recorded. Large tracts of the proposed road have already been cleared of natural vegetation and replaced in part by some exotics. However, many species of insects use or utilise grass species and it is expected that on completion of the ring road, the road verges will primarily be re-stocked naturally with pioneer grasses, many of which serving as food-plants of the listed butterflies. Except for *Kedestes lenis*, which may possibly be affected by construction and operation in sector 1 (section 1) of the road, no other large scale long-term detrimental impact on the local entomofauna is envisaged. The impact is thus rated as low with impact localized within the site boundary.

Sector 1 seems to present the major obstacle to affected and concerned parties, a point of view strongly expressed by the respective managers of the Rondevlei and Zandvlei Nature Reserves. Construction of the road in this sector especially, but also along sections 7 and 8, will result in the fragmentation of urban and rural habitats. With time, effluent from the road may affect the composition of the vegetation along the road verges and surrounds. This in turn may impact on the composition of its vegetation. Road traffic itself may also lead to extensive road kills of insects.

5. SUMMARY OF MITIGATION MEASURES/RECOMMENDATIONS

Design:

- (a) No special requirements as to the design of the planned road is needed. However, it is important that a road reserve of some width be incorporated into the design.

Construction:

- (a) During the construction phase care should be taken to ensure that the area required by the road constructors and damage to the habitat be limited to reduce the impact on its immediate surroundings.
- (b) Storage of building materials, garaging of road building equipment and fuel storage should be at predetermined sites to minimize negative effects on the immediate environment.

- (c) Location of borrow-pits and quarries should be selected to cause minimal impact to the environment.
- (d) An Environmental Site Officer (ESO) should be appointed during the construction, rehabilitation and operational phase of the project to ensure compliance with environmental prescriptions, recommendations and practice. The ESO is also to take responsibility for the training in environmental practice to construction and maintenance workers as well as to road users.

Operation:

- (a) Re-establishment of natural vegetation after completion of construction is to be implemented wherever practically possible. Locally indigenous plants should be used for rehabilitation of the road verges in all sectors. Invasion by or planting of exotics in the road verges is not to be allowed. Fencing of the road will provide some measure of protection against pollution, dumping of refuse and uncontrolled fires. The use of herbicides (and insecticides) is only to be permitted at toll gates. Ideally, controlled burning of vegetation should be implemented as a means of control (although this recommendation may clash with local council regulations) where vegetation becomes a fire risk and to create a mosaic of uneven aged vegetational diversity.
- (b) Studies on the presence/absence of *Kedestes lenis* should be carried out within one year subsequent to the completion of this phase of road construction. In its absence, re-establishment of this species should be decided upon after consultation with the relevant nature conservation bodies and local specialists.

6. SUMMARY AND CONCLUSION

Construction and maintenance of roads will result in loss of some biodiversity at the local level due to restriction of habitat, habitat fragmentation, increased mortality, invasion by exotics and road kills. Flying insects will be less affected as they are able to readily disperse elsewhere if and when suitable habitats are close by.

More than half the number of butterfly species are quite adapt at colonising altered habitats, such as suburban gardens; most of these are fairly common as a result. However two of the listed butterflies, *Kedestis lenis* and *K. barbarae bunta*, have been singled out as potential victims of the planned road project. *K. lenis* is known to occur on the exact location where section 1 of the road is planned. The possibility of its re-introduction to sector 1, should it be absent after the completion of the construction phase, is mooted, but whether such a transfer will be successful cannot be guaranteed. However, it is also found south of section 2, in an area also shared by *K. barbarae bunta*.

From the entomologist's point of view, provided the mitigation measures and recommendations made are implemented, there should not be any negative impact (but see the comments re *K. lenis*) likely to affect the decision to proceed with the project. Sector 1 proves to be the most contentious part of the planned road and serious consideration should be given to an alternative route.

7. APPENDIX

BUTTERFLIES ASSOCIATED WITH THE N21 (R300) CAPE TOWN RING TOLL ROAD

(Bracketed numbers after each species name is that given in *Pennington's Butterflies of southern Africa*, the standard work on South African butterflies. All species are illustrated on Plates 1 and 2)

Nymphalidae

Danainae

1. *Danaus chrysippus aegyptius* (Schreber) (African Monarch) (1a)

The African Monarch is easily recognizable by its size and black and white markings on a reddish-brown wing surface. It frequently wanders into gardens, feeding on flowers. Adult butterflies are mostly seen from January to June, but fly throughout the year. Eggs are laid singly on the food-plant. Food-plants include: *Asclepias curassavica*, *A. fruticosa*, *Ceropegia* sp., *Cynanchum obtusifolium* and other members of the family Asclepiadaceae.

This butterfly can be expected to be present along all sections of the planned road.

Satyrinae

2. *Dira clytus clytus* (L.) (Autumn Brown) (23a)

The butterfly is on the wing from mid-March to mid-May. It is seen practically everywhere, on patches of road-side grass, on lawns and even in the streets. In places it is fairly abundant. They seldom feed at flowers. Eggs are scattered in the grass. The larva takes five to six months to complete its feeding stage and aestivates for about three months, changing into a pupa in February. There is usually only a single brood. Food-plants include: *Afrachneria capensis*, *Cynodon dactylon*, *Hyparrhenia hirta*, *Merxmuellera stricta*, *Oropetium capense*, *Ehrharta erecta*, *Panicum deustum*, *Stenotaphrum glabrum*, *S. secundatum*, *Tribolium uniolae* and *Stipa dregeana* (Poaceae) and *Ficinia indica* (Cyperaceae).

This Western Cape butterfly can be expected to be present along all sections of the planned road.

3. *Torynesis mintha mintha* (Geyer) (Mintha Widow)(30a)

Although rather similar to *D. clytus clytus*, and often seen with the latter species, it can be distinguished from the latter species by the silver-coloured veins on the underside. Their larvae are also grass-feeders and frequent some of the places visited by *clytus* and other Browns which fly in autumn. It has been recorded across the Cape Flats. *Mintha* is more selective in its choice of food-plants and consequently its distribution is patchy and more localised. It occurs in numbers only where its food-plant grows in abundance and certain spots are favoured. The species is confined to the Western Cape and is on the wing from late March till early May. Eggs are scattered among grass and its life history follows a similar pattern as that of *clytus*. Food-plants include *Merxmuellera stricta* (Poaceae) and *Ficinia* sp. (Cyperaceae).

This butterfly can be expected to be present in sections 1, 2, 7 and 8 of the planned road.

4. *Tarsocera cassus cassus* (L.) (Spring Widow)(36a)

This species shows some resemblance to *D. clytus*, but differs in having its flight period from late August until December. It is a fairly fast flier. Adult butterflies often feed at flowers and often settle on bare ground. It is common in its favoured places, but not generally about. Food-plants include *Hyparrhenia hirta* *lolium temulentum*(Poaceae).

This butterfly can be expected to be present only in sections 1, 2, 7 and 8 of the planned road.

5. *Cassionympha cassius* (Godart) (Common Brown) (47)

The most plentiful and widely distributed Brown in South Africa. It prefers the wetter and more wooded areas. Its flight is described as "hopping" about bushes and over grass, sometimes settling on a flower or on the ground. It is rather partial to spots near streams. It is double-brooded and, but for the winter months, on the wing for most part of the year. Eggs are laid singly on grass. Food-plants include *Pentaschistis capensis* (Poaceae) and *Juncus capensis* (Juncaceae).

It can be expected to be present in sections 1, 2, 7 and 8 of the planned road.

6. *Melampias huebneri* Van Son (Boland Brown)(48)

The normal flight-period of this fairly common butterfly is from the end of July until the end of November. It is restricted to the Western Cape, where it is found mainly on hillsides and bush-clad sand-dunes. Eggs are laid singly on grass and larvae feed on grass until its food-plant withers during the summer months. The larva then enters a period of aestivation, starting to feed again in autumn and early winter when the grasses resume their growth. Food-plants include the introduced *Avena sativa* and the indigenous *Ehrharta erecta* (Poaceae).

The butterfly can be expected to be present in all sections of the planned road.

7. *Pseudonympha magus* (Fabricius) (Silver-bottom Brown)(60)

In the Cape Peninsula this species is on the wing from October until May and is particularly fond of open grassy spaces. It is prevalent in marshy places or neighbouring grass-grown areas, its real haunts being the Cape Flats and other marshy areas of the Western Cape. The butterfly likes to settle on bare patches of ground amongst the grass, and often feeds at flowers. The distribution of *magus* is restricted to the coastal or near coastal areas. The species is double-brooded. Eggs are laid singly on grasses, including *Cynodon dactylon* and *Ehrharta erecta* (Poaceae).

The butterfly can be expected to be present along all sections of the planned road.

8. *Stygionympha vigilans* (Trimen and Bowker) (Western Hillside Brown) (73)

This butterfly is particularly common in the Western Cape, especially around Cape Town. Adult butterflies are on the wing from August till May, flying at sea level and upwards to the mountain slopes. There are at least two broods during its extensive flight period. Eggs are laid singly on grass. Its known food-plants include *Ehrharta erecta* and *Ischyrolepsis cincinnata* (Poaceae) and *Restio cincinnatus* (Restionaceae).

The butterfly can be expected to be present along sections 1, 2, 7 and 8 of the planned road.

Acraeinae

9. *Acraea horta* (L.) (Garden Acraea)(91)

This species is a frequent visitor, or inhabitant, of Cape gardens and parks and is known throughout South Africa. It is widely dispersed in the Western Cape, but may be quite abundant in those areas where the Wild Peach (*Kiggelaria africana*), the food-plant of the caterpillar, occurs. *Horta* flies throughout the year, but is somewhat scarcer during the colder winter months. The adult butterflies visit many flowers and often settle on leaves of a wide variety of trees and shrubs. Eggs are laid in clusters on leaves of the food-plant. Caterpillars are gregarious in the earlier development, but spread out as they grow. They can become a nuisance in gardens by defoliating Granadilla plants and other passion flowers. The pupae are suspended against walls (to the annoyance of house occupiers) and other erect objects in built-up areas. Its known food-

plants are: *Kiggelaria africana* (Flacourtiaceae) and *Passiflora coerulea*, *P. incarnata*, *Tacsonia* sp. and other species, including *Granadilla* (Passifloraceae).

The butterfly can be expected to be present along the entire length of the planned road.

Nymphalinae

10. *Vanessa cardui* (L.) (Painted Lady) (240)

The nearly cosmopolitan species is named after one of its many food-plants, *Carduus* or thistle. The butterfly is known to migrate over long distances and frequently present in the veld or in gardens, in the centre of towns and along highways. The caterpillars feed on a large variety of plants and are present almost throughout the year. Eggs are laid singly on leaves of food-plants. The young caterpillar spins a fine silken web over itself, under which it feeds and rests. Older, larger larvae form a purse by pulling the edges of the leaf together. Their list of food-plants is extensive and includes: *Carduus* spp., *Arctotheca calendula*, *Arctotis stoechadifolia*, *Gazania* sp., *Gnaphalium purpureum*, *G. luteo-album*, *Berkheya discolor* (Asteraceae), *Lavatera arborea*, *Malva parviflora* (both introduced species) (Malvaceae), *Phaseolus vulgaris* (Fabaceae), *Boehmeria nivea* (Urticaceae) and many other plants, including Hollyhocks and Lupins.

The Painted Lady is present along the entire length of the planned road.

Lycaenidae

11. *Phasis thero thero* (L.) (Silver Arrowhead)(382a)

This butterfly is largely confined to the southwestern Cape and the Cape Peninsula. Bushes among the sand dunes are favoured. It is flying from August to November and a second brood from March to May. Food-plants recorded are: *Rhus undulata*, *R. incisa* (Anacardiaceae) and *Melianthus major* (Melianthaceae).

It is expected along sections 1, 2, 7 and 8 of the planned road.

12. *Aloeides thyra* (L.) (Red Copper)(394)

The flight-period of this butterfly ranges from August to April. It is almost restricted to the Western Cape, occurring from sea-level to higher elevations. The butterfly is very fond of visiting flowers. The early stages of *thyra* enjoy a close association with ants. During the night, the caterpillars feed on *Aspalathus* leaves, but shelter during daytime in the nests of the small black Sugar Ant, *Acantholepis capensis* Mayr. Little is known about its life history, but eggs and larvae have been found on *Aspalathus acuminata* subsp. *pungens*, *A. cymbiformis*, and *A. laricifolia* (Fabaceae).

The butterfly is expected to be present in section 1, 2, 7 and 8 of the planned road.

13. *Aloeides pierus* (Cramer) (Dull Copper)(438)

This butterfly is common in the Cape Peninsula and plentiful within a wide radius of Cape Town. Its normal flight-period is from September to October to late April, with lesser numbers in some localities in midsummer. Food-plant: *Aspalathus* spp. (Fabaceae).

A. pieris is expected to be present in sections 1, 2, 7 and 8 of the planned road.

14. *Aloeides almeida* (Felder) (Almeida Copper)(445)

This species is known from the flattish ground at Durbanville and further northwards along the eastern seaboard, but not close to the shore, towards the eastern Cape. The normal flight-period is from September to April. Its larval food-plants are not known.

The butterfly may be present in sections 7 and 8 of the planned road.

15. ***Chrysoritis zeuxo*** (L.) (Jitterbug Daisy Copper)(449)

This butterfly keeps very close to its food-plant which is also extensively planted along some of our national roads, as on the N2, but also forms part of the natural vegetation. The distribution of the butterfly thus tends to be patchy. It is plentiful in some spots on the Cape Flats and occurs at and beyond Strandfontein. Butterflies are on the wing from September to January. Eggs are laid singly on a leaf or leaf-stalk. Later-instar larvae construct a shelter by drawing the edges of a leaf together. Its only food-plant is *Chrysanthemoides monilifera* (Asteraceae).

The butterfly is expected to be present in sections 1, 2, 7 and 8 of the planned road.

16. ***Chrysoritis zonarius*** (Riley) (Donkey Daisy Copper)(450)

In appearance, this butterfly closely resembles *zeuxo*. *Zonarius* is slightly smaller and darker than *zeuxo*. The species do not fly together and their larvae use different, but related, food-plants. This species is common along the coast from Milnerton to Melkbosch Strand and further northwards. Its life history is unknown. *Chrysanthemoides incana* (Asteraceae) is its known food-plant.

The butterfly is present in sections 7 and 8 of the planned road.

17. ***Poecilmitis chrysoar*** (Trimen) (Burnished Opal)(458)

A widespread species in southern Africa. It is found at sea level near Bloubergstrand. The butterfly flies swiftly, settling often on shrubs. It flies throughout the year. Food-plants recorded are: *Cotyledon orbiculata* (Crassulaceae), *Zygophyllum sessilifolium* (Zygophyllaceae), *Rhus* sp. (Anacardiaceae).

The butterfly is present along sections 7 and 8 of the planned road.

18. ***Poecilmitis felthami*** (Trimen) (Feltham's Opal)(461)

This butterfly lives in several confined areas on the Cape Flats and occurs in several other localities including Durbanville en Melkbosstrand, but its distribution extends towards Stilbaai and Lambert's Bay. Its flight-period starts in September until June. Food-plants are: *Zygophyllum flexuosum* and *Z. sessilifolium* (Zygophyllaceae).

It is expected to be present along sections 1, 2, 7 and 8 of the planned road.

19. ***Lycaena orus*** (Stoll) (Western Sorrel Copper)(507)

This butterfly is partial to streams, vleis and marshy places where its food-plants (Dock and Sorrel) grow. It inhabits the Cape Peninsula and the southern parts of South Africa as far east as Port Elizabeth. The butterfly is common at almost sea level at some places near Cape Town. The species flies throughout the year, but is scarcer during May – September. Eggs are laid singly among leaves and flowers. Food-plants include: *Polygonum undulatum* and probably *Rumex lanceolatus* (Polygonaceae) in damp places.

The butterfly should be present in sections 7 and 8 of the planned road.

20. ***Anthene definita definita*** (Butler) (Common Hairtail) (509a)

Both sexes often visit flowers, and are common visitors to gardens. Their larvae feed on buds and flowers of a great variety of indigenous plants, but also on Australian Acacias. The species is widely distributed in South Africa and flies throughout the year, being most prolific during the spring and summer months. Eggs are laid singly on buds. Food-plants: *Crassula arborescens*, *Kalanchoe* sp. (Crassulaceae), *Acacia saligna* (Mimosoideae), *Myrica serrata* (Myricaceae) and various other shrubs and trees planted in gardens.

The butterfly is present along the entire length of the planned road.

21. ***Cacyreus lingeus*** (Stoll) (Bush Bronze)(538)

This butterfly ranges over the greater part of Southern Africa and is most often found in the vicinity of *Salvia africana* (Wild Sage) and *Leonotis leonurus* (Wild Dagga) and other members

of the family Labiatae. The female lays her eggs amongst the buds of these plants. Larvae feed on these buds, as well as on the flowers and the seeds. The species is frequently found in gardens where it visits the fragrant flowers of Mint, Sage, Lavender, *Salvia* and *Coleus* and on which eggs are laid. Butterflies are mostly seen during the milder and warmer months of the year. Eggs are laid singly on buds. Food-plants include: *Calamintha* spp., *Coleus* spp., *Lavendula* spp., *Mentha* spp., *Salvia* spp., *Leonotis leonurus* and *Plectanthurus* spp. (Labiatae).

The butterfly is present all along the planned road.

22. ***Cacyreus virilis*** (Aurivillius) (Mocker Bronze)(539)

This species is better known from elsewhere in South Africa where it occurs prevalently in the eastern inland areas. Its habits, food-plants and general appearance is similar to *C. lingeus*. A male of *C. virilis* was collected at Strandfontein by AJ Duke in November 1938, but has not been collected since.

The butterfly is absent along the planned road.

23. ***Cacyreus palemon palemon*** (Stoll) (Water Bronze)(540a)

This insect has been reported from all parts of south Africa. Although fond of damp places and often encountered along streams, it is not confined to such habitats and occurs frequently in dry and open country and at the coast wherever its food-plants grow. The butterfly is extremely fond of visiting flowering Pelargoniums. Eggs are laid singly on the buds and young seeds of the food-plants, the larvae feeding in the seeds which they burrow as they feed on the contents. Its fondness for Geranium and Pelargoniums has attracted this butterfly into gardens where it can establish itself fairly well. Butterflies are present almost throughout the year, but in lesser numbers during the winter months. Eggs are laid on the buds and seeds and, occasionally, leaves of *Geranium* and *Pelargonium* spp. (Geraniaceae).

The butterfly is present wherever its food-plant is found all along the planned road.

24. ***Cacyreus marshalli*** Butler (Common Geranium Bronze)(541)

As the species before, it is also fond of Geraniums and Pelargoniums. It is often found on hill-sides and at sea-level and particularly common in the South-western Cape. The butterfly is on the wing throughout the year, and most commonly seen in all the warmer months of the year. Its life history, seasonal occurrence, food-plants and habits are as those of *C. palemon palemon*. Both species are rated as common.

The butterfly is found wherever its food-plant is found all along the planned road.

25. ***Leptotes pirithous*** (L.) (Common Blue)(547)

This butterfly is attracted to Plumbago, one of its principal food-plants, and is found almost everywhere wherever the plant is present. The females lay their eggs singly on the buds, stalks and flowers of this plant, but will also oviposit on lucerne. Butterflies fly during most, but the coldest, months of the year. Food-plants include: *Indigofera* sp., *Medicago sativa*, *Melilotus* sp., *Mundulea* sp., *Rhynchosia* spp., *Vigna* spp. (Caesalpinioideae), and *Plumbago auriculata* (Plumbaginaceae).

The butterfly is, in conjunction with its food-plant(s), present all along the planned road.

26. ***Lampides boeticus*** (L.) (Long-tailed Blue)(552)

This very common butterfly occurs throughout Southern Africa and beyond. It is one of the few butterflies with the potential to become an agricultural pest as their larvae feed on, amongst other plants, lucerne and peas. The butterfly visits leguminous plants either to feed on the flowers or to lay eggs on the flowerbuds in which the larvae develop. It is multi-brooded and the butterfly is out throughout the year, being most plentiful during the summer months. Known food-plants include: *Colutea* sp., *Lathyrus* sp., *Virgilia oroboides*, cultivated peas (Leguminosae), *Crotalaria* spp., *Cytisus* sp., *Dolichos* spp., *Lupinus* sp., *Medicago sativa*, *Phaseolus* sp., *Pisum* sp.,

Podalyria sp., *Sutherlandia frutescens* (Fabaceae), and *Indigofera psoraleoides*, *Psoralea fruticans* (Leguminosae).

The butterfly is present all along the planned road.

27. ***Tarucus thespis*** (L.) (Vivid Blue)(554)

The butterfly flies in coastal areas and over flat country wherever its food-plant occurs. Adults are on the wing throughout the year, but are rarer during the winter months. Eggs are laid singly on leaves of *Phyllica imberbis* (Rhamnaceae).

The butterfly is present wherever its food-plant is present along the planned road.

28. ***Lepidochrysops robertsoni*** Cottrell (Robertson's Blue)(564)

This butterfly flies in the company of *L. methymna methymna*. It is smaller than and can easily be mistaken for a smaller specimen of the latter. It is suspected that the species is double-brooded. Although found in mountainous regions, specimens have been caught at sea-level at Strandfontein in habitats similar to that of the *L. methymna methymna*. Their food-plants are: *Selago spuria* and *S. serrata* (Selaginaceae). The larva has been found in association with the ant *Camponotus niveosetosus* Mayr.

It is not known whether it is (still) present in sections 1 and 2, its most probably habitat, of the planned road.

29. ***Lepidochrysops trimeni*** (Bethune-Baker) (Trimen's Blue)(618)

The butterfly is restricted to the south-western Cape, within a fair radius of Cape Town. Although Clark & Dickson (1971) and Claassen & Dickson (1980) mention this butterfly to be present near Melkbosstrand, I have in all my years of collecting in the area between Blouberg and Melkbosstrand never encountered this species. The species is known to occur in pockets across the Cape Flats. Food-plants: *Selago* spp., including *S. serrata* (Selaginaceae). Larvae and pupae have been found in the nest of the ant *Camponotus maculatus*.

It is present in sections 1 and 2 and may be present in sections 7 and 8 of the planned road.

30. ***Eicochrysops messapus messapus*** (Godart) (Cupreous Blue)(637a)

The range of this butterfly extends throughout the southern parts of the Cape Province and is particularly common near Cape Town. It flies among shrubs on the grassy flats and is often seen feeding on the flowers of low-growing *Aspalathus* plants. It is on the wing throughout the year. Food-plant: *Thesium* spp. (Santalaceae).

It may be present along sections 1, 2, 7 and 8 of the planned road.

31. ***Zizeeria knysna*** (Trimen) (Sooty Blue)(646)

Although not occurring numerously in any one locality, it is one of South Africa's most widely distributed butterflies, and in places where its food-plants grow in abundance, small colonies of the butterfly may occur. The butterfly is present on the flatlands and frequently found in gardens and on road verges. One of its favourite food-plants is the thorny weed *Tribulus terrestris*. These small butterflies are on the wing throughout the year. Food-plants include: *Amaranthus deflexus*, *A. viridis* (Amaranthaceae), *Euphorbia* sp. (Euphorbiaceae), *Oxalis corniculata* (Oxalidaceae), *Medicago sativa*, *Zornia* sp. (Fabaceae) and *Tribulus terrestris* (Zygophyllaceae).

This butterfly is present all along the planned road, and was found to be exceedingly common at Zeekoevlei in March.

Papilionidae

32. *Papilio demodocus* Esper (Citrus Swallow-tail) (715a)

The butterfly is widespread throughout South Africa and it is a frequent visitor to gardens and parks. It is on the wing throughout the year, except during the colder winter months. It is particularly fond of visiting citrus trees and which the female will lay her eggs. Food-plants include the following: cultivated *Citrus* spp. (Rutaceae) and *Foeniculum vulgare* (Umbelliferae).

The Citrus Swallow-tail should be present all along the route of the planned road.

Pieridae

33. *Colias electo electo* (L.) (African Clouded Yellow) (658a)

In lucerne and clover fields it often occurs in vast numbers and at times its caterpillars become serious pests of these crops. Elsewhere the caterpillars feed on a variety of wild leguminous plants and do not occur in particularly large numbers. The butterfly frequently visits gardens and is a common road-side insect, behaving like a restless and tireless wanderer, always on the move in search of nectar for itself or food-plants for its caterpillars. It is most abundant during the summer months and flies throughout the year. Food-plants include: *Medicago sativa*, *Trifolium africanum*, *Vicia sativa* (Fabaceae).

The butterfly is present in all sections of the planned road.

34. *Catopsilia florella* (Fabricius) (African Migrant)(659)

These butterflies reach the Cape Peninsula in early summer as migrants from parts of South Africa where it is more numerous; their offspring often breed successfully in the Western Cape. However, they can only breed on certain exotic plants, the known food-plants in the Cape being *Senna occidentalis*, *S. septemtrionalis*, *S. petersiana* (Fabaceae).

The butterfly is present wherever its (exotic) food-plant is present.

35. *Pieris (Pontia) helice helice* (L.) (Meadow White) (701a)

The butterfly is one of South Africa's most widely distributed butterflies. It is a common species often flying close to the ground, searching for suitable food-plants for the larvae, or for flowers to feed on. The butterfly is also fond of lucerne, being attracted to the flowers to obtain nectar. It is on the wing throughout the year and in its favourite haunts remains plentiful even in winter. Eggs are laid singly on leaves, buds or seeds. Its food-plants include: *Alyssum* sp., *Heliophila linearis*, *Lepidium capense*, *Sisymbrium* sp. and *Rapistrum rugosum* (Cruciferae), *Resada odorata* (Resedaceae).

The butterfly is present in all sections of the planned road.

36. *Pieris brassicae* (L.) (Large Cabbage White)

This butterfly was introduced into the Cape around 1993 and has since expanded its distribution throughout the Western Cape Province. It flies almost throughout the year, with lesser numbers in the cooler winter months. Its food-plants are confined to Cruciferae, especially cultivated cabbage, and kappertjies. It is only included in the list for completeness sake.

The butterfly is present wherever its food-plants are found.

37. *Mylothris agathina* (Cramer) (Common Dotted Border)(707)

Since the late eighties, this butterfly has become a common sight in parts of the Cape Peninsula, especially on the slopes of the Muizenberg Mountains. Stragglers are often found in gardens some distance away. One of its larval food-plants is *Colpoon compressum* (Santalaceae).

The butterfly is present in sections 1, 7 and 8 of the planned road.

Hesperiidae

38. *Spialia nanus* (Trimen and Bowker) (Dwarf Sandman)(762)

This skipper is an inhabitant of karoid type vegetation, but is omnipresent in the Western and Northern Cape and is found on the Cape Flats. The butterfly is on the wing from September to the first half of May, but emergence on a small scale has been recorded in June and August of certain years when warmer summer-like conditions prevailed. Food-plants include: *Hermannia diffusa*, *H. incana*, *H. comosa*, *H. cuneifolia* var. *cuneifolia*, *H. pulverata* (Sterculiaceae) and *Hibiscus aethiopicus* (Malvaceae). Conservation status: a widespread species and is under no threat.

The butterfly may be present along the length of the road wherever its food-plants occur.

39. *Spialia sataspes* (Trimen) (Boland Sandman)(764)

This rare butterfly is mainly a coastal species, from the Cape Peninsula around to Grahamstown. It flies about grassy areas, settling on low shrubs and flowers or on the ground. It favours the warmer months September to March. Food-plants recorded: *Hermannia* spp. (Sterculiaceae), *Pavonia burchellii* and *Hibiscus aethiopicus* (Malvaceae). Conservation status: Although rather restricted in distribution, it does not appear to be under any threat.

It may be present along the entire length of the proposed road.

40. *Spialia diomus ferax* (Wallengren) (Common Sandman)(772a)

Distributed throughout southern Africa. In the Western Cape this butterfly is plentiful near the coast. It is on the wing throughout the year, but becomes scarcer during the colder winter months. Food-plants are: *Hermannia diffusa*, *H. incana*, *H. comosa*, *H. cuneifolia* var. *cuneifolia* (Sterculiaceae) and *Hibiscus aethiopicus* and *Pavonia burchellii* (Malvaceae). The species is common and widespread and is under no threat.

It is expected to be present along sections 1, 2, 7 and 8 of the planned road.

41. *Spialia spio* (L.) (Mountain Sandman)(773)

It inhabits most of southern Africa, except for the Northern Cape and parts of Namibia, though it is not so abundant at sea level, preferring the lower slopes of hills and valleys. This skipper is present throughout the year, but is rarely seen during the colder months in the southwestern Cape. The food-plants include the following: *Hermannia incana*, *H. diffusa*, *H. cuneifolia* var. *cuneifolia*, *H. comosa*, *H. coccocarpa* (Sterculiaceae), *Pavonia burchellii*, *P. columella*, *Hibiscus aethiopicus*, *H. pusillus*, *Lavatera arborea* (Malvaceae) and *Triumfetta* sp. (Tiliaceae). The species is widespread and under no threat.

It is expected to be present in all sections of the planned road.

42. *Spialia mafa mafa* (Trimen) (Mafa Sandman)(774a)

This species is present throughout South Africa. It is on the wing practically all the year, but mostly during September to April. Larval food-plants include: *Hermannia* spp., *H. depressa*, *H. comosa* (Sterculiaceae) and *Pavonia burchellii* and *Hibiscus aethiopicus* (Malvaceae). A local and widespread species under no threat.

It is expected to be present all along the planned road.

43. *Metisella malgacha malgacha* (Boisduval) (Grassveld Sylph)(780a)

This butterfly is commonly met on grassy slopes and gardens wherever its food-plants flourish, visiting flowers and grasses. Its distribution ranges from the Cape Peninsula, along the southern edge of the Karoo, and further north- and eastwards. Their main flight period is from August to June, but under favourable conditions, emergence occasionally takes place throughout

autum and winter. Eggs are laid singly on grass. Its food-plants include *Ehrharta erecta* (Poaceae). This butterfly is widespread and fairly common and under no threat.

It is expected to occur all along the route of the proposed road.

44. ***Metisella metis metis*** (L.) (Gold-spotted Skipper)(781a)

One of the more common skippers, distributed from the Cape Peninsula eastward towards Swellendam, flying in most places where water is present, especially where the grasses and other food-plants on which the larvae feed, flourish. It also frequents well-watered gardens feeding on flowers. In the Western Cape it is met throughout the year, but for the colder winter months. Eggs are laid on grasses, including *Ehrharta erecta*, *Panicum deustum*, *Stenotaphrum secundatum* and *Stipa dregeana* (Poaceae). It is not considered to be under threat.

The butterfly is expected to be present especially in all sections of the planned road.

45. ***Kedestes barberae bunta*** Evans (Barber's Ranger)(798c)

This butterfly frequents the Cape Flats and was discovered near Steenberg railway Station in October 1945. It was formerly abundant in grassy damp areas at Retreat and Strandfontein, but urbanization and alien vegetation have destroyed most of their habitats. The insect flies during September. Its larval food-plant is *Imperata cylindrica* (Poaceae). The local habitats could be threatened and it is at risk from invasion of alien vegetation and fires.

It is present only in section 2 of the planned road.

46. ***Kedestes lenis*** Riley (Unique Ranger)(800)

The butterfly has been observed on the Cape Flats at Strandfontein and is an inhabitant of grassy areas. It flies during October to about March. This skipper is confined to localities where its food-plant, *Imperata cylindrica* (Poaceae) grows.

It is present in sections 1 and 2 of the planned road.

47. ***Zophopetes dysmephila*** (Trimen) (Palm-tree Nightfighter)(822)

This dusk-flying butterfly was introduced in the Cape Peninsula during the early eighties. It is a common species along the coastal regions from East London northwards. The introduction of its foodplants as garden plants has resulted in its introduction into the Cape Peninsula. Its larval food-plants include: *Phoenix reclinata*, *P. canariensis* and *P. dactylifera* (Arecaceae).

The butterfly is expected to be present in all sections where the listed palms occur.

48. ***Pelopidas thrax inconspicua*** (Bertolini) (White-banded Swift)(838a)

Although widespread throughout southern Africa, this butterfly is rather localised, even when the food-plants are readily available, in the southwestern Cape. It has been found commonly in parts of the Cape Flats and near Retreat and Steenberg railway stations, restricted to grassy areas. It flies mainly during the warmer months of the year. Eggs are laid singly on grasses. Its food-plants include: *Ehrharta erecta*, *Imperata cylindrica* and *Stipa dregeana* (Poaceae).

The butterfly is expected to be present in sections 1, 2 and 3 of the planned road.

49. ***Gegenes niso niso*** (L.) (Common Hottentot Skipper)(852a)

This common skipper occurs almost everywhere in Southern Africa, including the Cape Peninsula, but excluding the northern Cape and the Free State. It occurs in many places where the grasses on which the larvae feed, grow. The butterfly is a frequent visitor to gardens. The species is on the wing throughout the year, but is rarer during June and July. Eggs are laid singly on grasses which include *Ehrharta erecta*, *Pennisetum clandestinum* and *Themeda triandra* (Poaceae). It is a common and widespread species and is under no threat.

This skipper is expected to be present in sections 1, 2, 3, 7 and 8 wherever its food-plants occur.

TABLE 1: PRESENCE OF BUTTERFLIES PER SECTION

X = present, - = absent

Species	SECTION							
	1	2	3	4	5	6	7	8
<i>Danaus chrysippus aegyptius</i>	X	X	X	X	X	X	X	X
<i>Dira clytus clytus</i>	X	X	X	X	X	X	X	X
<i>Torynesis mintha mintha</i>	X	X	-	-	-	-	X	X
<i>Tarsocera cassus cassus</i>	X	X	-	-	-	-	X	X
<i>Cassionympha cassius</i>	X	X	-	-	-	-	X	X
<i>Melampias huebneri</i>	X	X	X	X	X	X	X	X
<i>Pseudonympha magus</i>	X	X	X	X	X	X	X	X
<i>Stygionympha vigilans</i>	X	X	-	-	-	-	X	X
<i>Acraea horta</i>	X	X	X	X	X	X	X	X
<i>Vanessa cardui</i>	X	X	X	X	X	X	X	X
<i>Phasis thero</i>	X	X	-	-	-	-	X	X
<i>Aloeides thyra</i>	X	X	-	-	-	-	X	X
<i>Aloeides pierus</i>	X	X	-	-	-	-	X	X
<i>Aloeides almeida</i>	-	-	-	-	-	-	X	X
<i>Chrysoritis zeuxo</i>	X	X	-	-	-	-	X	X
<i>Chrysoritis zonarius</i>	-	-	-	-	-	-	X	X
<i>Poecilmithis chrysoar</i>	-	-	-	-	-	-	X	X
<i>Poecilmithis felthami</i>	X	X	-	-	-	-	X	X
<i>Lycaena orus</i>	-	-	-	-	-	-	X	X
<i>Anthene definita definita</i>	X	X	X	X	X	X	X	X
<i>Cacyreus lingeus</i>	X	X	X	X	X	X	X	X
<i>Cacyreus virillis</i>	-	-	-	-	-	-	-	-
<i>Cacyreus palemon palemon</i>	X	X	X	X	X	X	X	X
<i>Cacyreus marshalli</i>	X	X	X	X	X	X	X	X
<i>Leptotes pirithous</i>	X	X	X	X	X	X	X	X
<i>Lampides boeticus</i>	X	X	X	X	X	X	X	X
<i>Tarucus thespis</i>	X	X	X	X	X	X	X	X
<i>Lepidochrysops robertsoni</i>	X	X	-	-	-	-	-	-
<i>Lepidochrysops trimeni</i>	X	X	-	-	-	-	?	?
<i>Eicochrysops m. messapus</i>	X	X	-	-	-	-	X	X
<i>Zizeeria knysna</i>	X	X	X	X	X	X	X	X
<i>Papilio demodocus</i>	X	X	X	X	X	X	X	X
<i>Colias electo</i>	X	X	X	X	X	X	X	X
<i>Catopsilia florella</i>	X	X	X	X	X	X	X	X
<i>Pieris (Pontia) h. helice</i>	X	X	X	X	X	X	X	X
<i>Pieris brassicae</i>	X	X	X	X	X	X	X	X
<i>Mylothris agathina</i>	X	-	-	-	-	-	X	X
<i>Spialia nanus</i>	X	X	X	X	X	X	X	X
<i>Spialia sataspes</i>	X	X	X	X	X	X	X	X
<i>Spialia diomus ferax</i>	X	X	-	-	-	-	X	X
<i>Spialia spio</i>	X	X	X	X	X	X	X	X
<i>Spialia mafa mafa</i>	X	X	X	X	X	X	X	X
<i>Metisella m. malgache</i>	X	X	X	X	X	X	X	X
<i>Metisella m. metis</i>	X	X	X	X	X	X	X	X
<i>Kedestes barberae bunta</i>	-	X	-	-	-	-	-	-

<i>Kedestes lenis</i>	X	X	-	-	-	-	-	-
<i>Zophopetes dysmephila</i>	X	X	X	X	X	X	X	X
<i>Pelopidas thrax inconspicua</i>	X	X	X	-	-	-	-	-
<i>Gegenes niso niso</i>	X	X	X	X	X	X	X	X
Total	43	43	28	27	27	27	43	43

TABLE 2: FOOD-PLANTS OF THE LISTED BUTTERFLIES

Acacia saligna (Labill.) – *Anthene definita definita*
Afrachneria capensis – see *Pentaschistis steudelii*
Alyssum sp. – *Pieris (Pontia) helice helice*
Amaranthus deflexus L. – *Zizeeria knysna*
A. viridis L. – *Zizeeria knysna*
Arctotheca calendula (L.) Levyns – *Vanessa cardui*
Arctotis stoechadifolia (Berg.) – *Vanessa cardui*
Asclepias curassavica L. – *Danaus chrysippus aegyptius*
A. fruticosa L. – *Danaus chrysippus aegyptius*
Aspalathus acuminata subsp. **pungens** (Thunb.) R. Dahlgr. – *Aloeides thyra*
A. cymbiformis DC. – *Aloeides thyra*
A. laricifolia Berg. – *Aloeides thyra*
Aspalathus spp. – *Aloeides pierus*
Avena sativa L. – *Melampias huebneri*
Berkheya discolor (DC.) O. Hoffm. & Muschl. – *Vanessa cardui*
Boehmeria nivea (L.) Gaud. – *Vanessa cardui*
Calamintha spp. – *Cacyreus lingeus*
Carduus spp. – *Vanessa cardui*
Ceropegia sp. – *Danaus chrysippus aegyptius*
Chrysanthemoides incana (Burm. F.) Norl. – *Chrysoritis zonarius*
C. monilifera (L.) Norl. – *Chrysoritis zeuxo*
Citrus spp. – *Papilio demodocus*
Coleus spp. – *Cacyreus lingeus*
Colpoon compressum Berg. – *Mylothris agathina*
Colutea sp. – *Lampides boeticus*
Cotyledon cuneatum Trimen – *Poecilmitis chrysoar*
Crassula arborescens (Miller) Willd. – *Anthene definita definita*
Crotolaria spp. – *Lampides boeticus*
Cynanchum obtusifolium L. f. – *Danaus chrysippus aegyptius*
Cynodon dactylon Pers. – *Dira clytus clytus*, *Pseudonympha magus*
Cytisus sp. – *Lampides boeticus*
Danthonia – see **Merxmullera**
Dolichos spp. – *Lampides boeticus*
Ehrharta erecta Lam. – *Dira clytus clytus*, *Melampias huebneri*, *Pseudonympha magus*,
Stygionympha vigilans, *Metisella malgacha malgacha*, *M. metis metis*, *Pelopidas thrax*
inconspicua, *Gegenes niso niso*
Euphorbia sp. – *Zizeeria knysna*
Heliophila linearis (Thunb.) DC. – *Pieris (Pontia) helice helice*
Hermannia coccocarpa (Eckl. and Zeyh.) Kuntze – *Spialia spio*
Hermannia comosa Burch. ex DC. – *Spialia nanus*, *S. diomus ferax*, *S. spio*, *S. mafa mafa*
H. cuneifolia Jacq. var. *cuneifolia* – *Spialia nanus*, *S. diomus ferax*, *S. spio*

- H. diffusa* L.f. – *Spialia nanus*, *S. diomus ferax*, *S. spio*
H. depressa N.E. Br. – *Spialia mafa mafa*
H. incana Cav. – *Spialia nanus*, *S. diomus ferax*, *S. spio*
H. pulverata Andr. – *Spialia nanus*
Hermannia spp. – *Spialia sataspes*, *S. mafa mafa*
Hibiscus aethiopicus L. – *Spialia nanus*, *S. sataspes*, *S. diomus ferax*, *S. mafa mafa*, *S. spio*
Hibiscus pusillus Thunb. – *Spialia spio*
Hyparrhenia hirta (L.) Stapf. – *Dira clytus clytus*, *Tarsocera cassus cassus*
Ficinia indica (Lam.) Pfeiffer – *Dira clytus clytus*
Ficinia sp. – *Torynesis mintha mintha*
Foeniculum vulgare (Mill.) – *Papilio demodocus*
Gazania sp. – *Vanessa cardui*
Geranium spp. – *Cacyreus palemon palemon*, *C. marshalli*
Gnaphalium luteo-album L. – *Vanessa cardui*
G. purpureum L. – *Vanessa cardui*
Imperata cylindrica (L.) Raeschel – *Pelopidas thrax inconspicua*, *Kedestes barberae bunta*, *K. lenis lenis*
Indigofera psoraleoides L. – *Lampides boeticus*
Indigofera sp. – *Leptotes pirithous*
Ischyrolepsis cincinnata (Mast.) Linder – *Stygionympha vigilans*
Juncus capensis Thunb. – *Cassionympha cassius*
Kalanchoe sp. – *Anthene definita definita*
Kiggelaria africana L. – *Acraea horta*
Lathyrus sp. – *Lampides boeticus*
Lavatera arborea L. – *Vanessa cardui*, *Spialia spio*
Lavendula spp. – *Cacyreus lingeus*
Leonotis leonurus R. Br. – *Cacyreus lingeus*
Lepidium capense Thunb. – *Pieris (Pontia) helice helice*
Lupinus sp. – *Lampides boeticus*
Malva parviflora L. – *Vanessa cardui*
Medicago sativa L. – *Leptotes pirithous*, *Lampides boeticus*, *Zizeeria knysna*, *Colias electo electo*
Melianthus major L. – *Phasis thero thero*
Melilotus sp. – *Leptotes pirithous*
Mentha spp. – *Cacyreus lingeus*
Merxmullera stricta (Schrad.) (Conert.) – *Dira clytus clytus*, *Torynesis mintha mintha*
Mundulea sp. – *Leptotes pirithous*
Myrica serrata Lam. – *Anthene definita definita*
Oropetium capense Stapf. – *Dira clytus clytus*
Oxalis corniculata L. – *Zizeeria knysna*
Panicum deustum Thunb. – *Dira clytus clytus*, *Metisella metis metis*
Passiflora incarnata L. – *Acraea horta*
P. coerulea L. – *Acraea horta*
Pavonia burchellii (DC.) R.A. Dyer – *Spialia diomus ferax*, *S. mafa mafa*, *S. spio*
P. columella Cav. – *Spialia spio*
Pelargonium spp. – *Cacyreus palemon palemon*, *C. marshalli*
Pennisetum clandestinum Chiov. – *Gegenes niso niso*
Pentaschistis capensis (Nees) Stapf. – *Cassionympha cassius*
P. steudelii (Nees) McLean – *Dira clytus clytus*
Phaseolus vulgaris L. – *Vanessa cardui*
Phaseolus spp. – *Lampides boeticus*
Phoenix canariensis Chabaud – *Zophopetes dysmephila*
P. dactylifera L. – *Zophopetes dysmephila*

P. reclinata Jacq. – *Zophopetes dysmephila*
Phylica imberbis Berg. – *Tarucus thespis*
Pisum sp. – *Lampides boeticus*
Plectanthrus spp. – *Cacyreus lingeus*
Plumbago auriculata (Lam.) – *Leptotes pirithous*
Podalyria sp. – *Lampides boeticus*
Polygonum undulatum (L.) Berg. – *Lycaena orus*
Psoralea fruticans (L.) Druce – *Lampides boeticus*
Rapistrum rugosum (L.) – *Pieris (Pontia) helice helice*
Resada odorata L. – *Pieris (Pontia) helice helice*
Rhus undulata Jacq. – *Phasis thero thero*
Rhus incisa L. – *Phasis thero thero*
Rhus sp. – *Poecilmitis chrysoar*
Rhynchosia spp. – *Leptotes pirithous*
Rumex lanceolatus Thunb. – *Lycaena orus*
Salvia spp. – *Cacyreus lingeus*
Selago serrata Berg. – *Lepidochrysops robertsoni*, *L. trimeni*
S. spuria L. – *Lepidochrysops robertsoni*
Senna occidentalis (L.) Link – *Catopsilia florella*
S. petersiana (Bolle) Lock – *Catopsilia florella*
S. septemtrionalis (Viv.) Irwin and Barneby – *Catopsilia florella*
Sisymbrium sp. – *Pieris (Pontia) helice helice*
Stenotaphrum glabrum Trin. – *Dira clytus clytus*
S. secundatum (Walt.) Kuntze – *Dira clytus clytus*, *Metisella metis metis*
Stipa dregeana Steud. – *Dira clytus clytus*, *Metisella metis metis*, *Pelopidas thrax inconspicua*
Sutherlandia frutescens R. Br. – *Lampides boeticus*
Tacsonia sp. – *Acraea horta*
Themeda triandra Forssk. – *Gegenes niso niso*
Thesium spp. – *Eicochrysops messapus messapus*
Tribolium uniolae (L.f.) Adams. and Sprag. – *Dira clytus clytus*
Tribulus terrestris L. – *Zizeeria knysna*
Trifolium africanum Ser. – *Colias electo electo*
Triumfetta sp. – *Spialia spio*
Vicia sativa L. – *Colias electo electo*
Vigna spp. – *Leptotes pirithous*
Virgilia oroboides (Berg.) Salter – *Lampides boeticus*
Zornia sp. – *Zizeeria knysna*
Zygophyllum flexuosum Eckl. and Zeyh. – *Poecilmitis felthami*
Z. sessilifolium L. – *Poecilmitis chrysoar*, *P. felthami*

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