

# **THE PROPOSED R300 – TWO OCEANS TOLL HIGHWAY**

**ALTERNATIVE ALIGNMENTS ('FARMER'S ALTERNATIVE') BETWEEN ADDERLEY ROAD  
AND THE VISSERSHOEK INTERCHANGE**

## **ENVIRONMENTAL IMPACT ASSESSMENT: ENTOMOLOGY**

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	<b>Page</b>
<b>1. Introduction</b>	<b>3</b>
<b>2. Methods</b>	<b>4</b>
2.1 Literature review	4
<b>3. Results</b>	<b>4</b>
<b>Adderley Road - Vissershok Interchange</b>	
Anticipated Impact	5
Significance of Impact	6
Mitigation measures/recommendations	7
<b>4. Statement on the alternative route</b>	<b>8</b>
<b>5. Summary of mitigation measures/recommendations</b>	
Design	8
Construction	8
Operation	9
<b>6. Summary and conclusion</b>	<b>9</b>
<b>7. Appendix and Literature</b>	<b>9</b>

## THE R300 – TWO OCEANS TOLL HIGHWAY – ALTERNATIVE ROUTE ALIGNMENTS – 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. butterflies and dragonflies).
- 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 alternative alignment of the section between Adderley Road and Vissershok interchange 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 here is on butterflies and dragonflies. Reasons for this emphasis include the availability of authoritative sources of information, published and otherwise, of these insects, a general acceptance of butterflies and dragonflies as environmental indicators by scientists and the positive attitude and perception (“charismatic”) to butterflies, rather than insects in general, by the lay public. Insects other than butterflies and dragonflies will also be affected during the construction and operational stages of the planned re-alignment. 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 confined to the area under discussion.

Some 34 species of butterflies and 4 species of dragonflies are found in close association with and proximity to the habitats traversed by the alternative re-aligned routes (just beyond Spes Bona Road northwards and the other starting from Adderley Road northwards). The altered route(s) pass mainly through agricultural fields as does the existing alignment (= Sector 3 (northern Greenfields Section 7 of a former report) and traverses various patches of remnant vegetation often forming corridors allowing free movement of insects between the disturbed landscapes. All butterflies and dragonflies listed also occur in other parts of the country, especially in the Western Cape.

Fragmentation of natural habitats is a serious threat to many species of insects. As the re-aligned routes also traverse agricultural fields with a high historical degree of disturbance, the impact on insects in general will be minimal and similar to that stated in a previous report (Geertsema, 2002). 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).

The two alternative subroutes were assessed for possible impacts on butterfly and dragonfly species expected or confirmed to occur for the re-aligned routes. Some of the mitigation measures proposed are generic. 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

A list of the butterfly and dragonfly fauna expected or known to occur along the new alignments of the R300 – Two Oceans Toll Highway was compiled by making use of literature, personal observations and by studying some private local collections. Site visits were made on 17 August, and 6 September, 2003.

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 and dragonflies 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.

## 3. RESULTS

Four butterfly families and two dragonfly families are known from the region under discussion: butterflies Nymphalidae: Danainae (1 species), Satyrinae (7 species), Nymphalinae (1 species);

Lycaenidae (15 species); Papilionidae (1 species); Pieridae (3 species, including one introduced European species); and HesperIIDae (6 species); dragonflies Libellulidae (3 species) and Gomphidae (1 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 species of butterflies and dragonflies are listed in the Appendix (7.) in which the habits, seasonal occurrence and food-plants of each species are briefly discussed. 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. Larvae of dragonflies are confined to aquatic habitats.

## CONSERVATION STATUS

**Red data species:** None of the butterflies listed are either **endangered, vulnerable** or considered **rare**. No red list is available of dragonflies as yet.

**Nature Conservation Ordinance, 1974** (Ordinance 19 of 1974 of the Province of the Cape of Good Hope) and **Western Cape Nature Conservation Laws Amendment Act, No. 3, 2000:** None of the 34 butterfly species and 4 dragonfly species listed has been proclaimed a **scheduled** species.

## ALTERNATIVE ALIGNMENTS

Two re-alignments of the proposed route (Highway section 7, Northern Greenfields) have recently been proposed. Both re-alignments will traverse similar habitats as that of the existing alignment. The new route(s) pass through areas that have been disturbed for a considerable time by intense farming activities (grain, pasture and vineyards). Some natural renosterveld vegetation occurs in patches. The small wetland close the crossing of Malanshoogte Road and the re-aligned route and the Diep River contain riverine vegetation, in places invaded by exotic Acacias or Eucalyptus. Many of these patches of suitable habitats form important corridors for many animals, including insects. The diversity of suitable habitat and vegetation is also reflected by the high (34) number of butterfly species present. Most of these butterflies are common. Dragonflies are fairly specific as to habitat and those reported here have a distribution well beyond the Western Cape.

### Anticipated Impact

All 34 listed butterflies are either found or expected to be found along the entire route; the 4 dragonfly species are associated with the Diep River. No permanent impact on these is expected as their numbers along the proposed re-alignments are rather low. Construction of the re-aligned road will thus have little impact on the diversity and numbers of butterfly and dragonfly species. Sufficient habitats in close proximity to the planned road for the survival and maintenance of populations of various insects, including butterflies and dragonflies, are present. Neither the construction or operation of the re-aligned route will impact negatively on any insect species along this section. Part of the re-aligned route 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

<b>Intensity = L</b>				
<b>Duration</b>	H			
	M			Medium
	L	Low	X	
<b>Intensity = M</b>				
<b>Duration</b>	H			High
	M		Medium	
	L	Low		
<b>Intensity = H</b>				
<b>Duration</b>	H			
	M			High
	L	Medium		
		L	M	H
<b>Extent</b>				

(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 the re-alignment.
- (i) The expected impacts of the proposed re-alignment is 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. Reclamation of part of the agricultural land along the re-aligned route 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. Preservation of wetland habitats should, however, be attempted by construction of bridges and prevention of unnatural sedimentation into such wetlands.
- (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
<b>Without Mitigation</b>	Low	Limited	Limited	Low	Low	95%	95%
<b>With Mitigation</b>	Low	Limited	Limited	Low	Low	95%	95%

\*The alternative route(s) run, as was the case before re-alignment, through landscape already altered by agricultural activities

#### **4. STATEMENT ON THE PROPOSED RE-ALIGNMENT BETWEEN SPES BONA ROAD AND THE VISSERSHOK INTERCHANGE**

From the environmental point of view, disturbance will be caused by the impending construction and operation of the road. Re-alignment of the route will traverse areas containing small areas of natural vegetation. At least 34 species of butterflies and 4 species of dragonflies are present along the proposed route.

From the entomological point of view, the insect communities of the wetlands, riverine areas and remaining patches of shrubland vegetation require special attention. The proposed re-aligned routes have already been cleared of natural vegetation and utilised for agricultural use. However, many species of insects use or utilise pioneer grass species and it is expected that the road verges will primarily be re-stocked naturally with pioneer grasses, many of which serve as food-plants of the butterflies. The impact is thus rated as low with impact localized within the site boundary.

#### **5. SUMMARY OF MITIGATION MEASURES/RECOMMENDATIONS**

##### **Design:**

- (a) No special requirements as to the design of the planned re-aligned 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 tollgates. 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 vegetation diversity.

## 6. SUMMARY AND CONCLUSION

Construction and maintenance of the re-aligned routes will result in minimal, if any, loss of some biodiversity at the local level due to restriction of habitat, habitat fragmentation, increased mortality, invasion by exotics and road kills. Winged 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 and all dragonfly species listed are fairly common.

From the entomological point of view, provided the mitigation measures and recommendations made are implemented, there should not be any negative impact as the alternative route traverses a similar range of habitats as does the original route.

## 7. APPENDIX

### BUTTERFLIES PRESENT ALONG THE PROPOSED RE-ALIGNMENT OF THE ROUTE BETWEEN SPES BONA ROAD AND THE VISSERSHOK INTERCHANGE

(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 listed, are illustrated on Plates 1 and 2 of Geertsema, 2002.

#### 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.

##### 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 and on lawns. 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).

### 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 *D. clytus* and other Browns which fly in autumn. *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 to that of *D. clytus*. Food-plants include *Merxmuellera stricta* (Poaceae) and *Ficinia* sp. (Cyperaceae).

### 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).

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

The most plentiful and widely distributed Brown in South Africa. It prefers the wetter and shaded 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 grasses such as *Pentaschistis capensis* (Poaceae) and *Juncus capensis* (Juncaceae).

### 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. 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).

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

It 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).

### 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).

### Nymphalinae

#### 9. *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.

### Lycaenidae

#### 10. *Phasis thero thero* (L.) (Silver Arrowhead)(382a)

This butterfly is largely confined to the South-western Cape and the Cape Peninsula. It is on the wing from August to November and has a second brood from March to May. Food-plants recorded are: *Rhus undulata*, *R. incisa* (Anacardiaceae) and *Melianthus major* (Melianthaceae).

#### 11. *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).

#### 12. *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).

#### 13. *Aloeides almeida* (Felder) (Almeida Copper)(445)

This species is known from the flattish ground in the Durbanville district 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 unknown.

#### 14. *Chrysoritis zeuxo* (L.) (Jitterbug Daisy Copper)(449)

This butterfly keeps very close to its food-plant, the latter extensively planted along some of our national roads, as on the N2, but also part of the natural vegetation. The distribution of the butterfly thus tends to be patchy. 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).

#### 15. *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).

16. ***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 and on hills. 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.

17. ***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.

18. ***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 buds and seeds and, occasionally, leaves of *Geranium* and *Pelargonium* spp. (Geraniaceae).

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

As the species before, it is also fond of Geraniums and Pelargoniums. It is often found on hillsides 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.

20. ***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).

21. ***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 flower buds 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), *Indigofera psoraleoides*, and *Psoralea fruticans* (Leguminosae).

22. ***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).

23. ***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 the planned re-aligned road.

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

Although not numerous 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 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).

### Papilionidae

25. ***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).

### Pieridae

26. ***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 roadside 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).

27. ***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), and *Resada odorata* (Resedaceae).

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

This exotic 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 Nasturtium. It is only included in the list for completeness sake.

### Hesperiidae

29. ***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 the planned re-aligned road.

30. ***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 south-western 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 along the planned re-aligned road.

31. ***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.

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

This butterfly is common on grassy slopes 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 autumn 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.

33. ***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. 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.

34. ***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.

DRAGONFLIES PRESENT ALONG THE PROPOSED RE-ALIGNMENT OF THE ROUTE BETWEEN SPES BONA ROAD AND THE VISSERSHOK INTERCHANGE: DIEP RIVER

**Gomphidae**

1. ***Ceratogomphus pictus*** (Hagen)

A common widespread species, ranging throughout southern Africa. Associated with exposed margins of water bodies, including still and flowing waters.

**Libellulidae**

2. ***Trithemis stictica*** (Burm.)

A common widespread species, ranging from the Western Cape throughout the eastern part of southern Africa.

3. ***Crocothemis sanguinolenta*** Burm.

A common widespread species, frequenting grass- and sedge-lined margins of streams and ponds.

4. ***Crocothemis erythraea*** Brullé

Very common species, ranging from the southwestern Cape to the southern part of Europe; also present in West Asia and Australia. Frequents grass- and sedge-lined margins of streams, ponds and marshes.

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