

An avifaunal impact assessment for the proposed N21 (R300) Cape Town Ring Road Toll Project.

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**R300 EXTENSION/N21 CAPE TOWN RING ROAD TOLL PROJECT –
ENVIRONMENTAL IMPACT ASSESSMENT - BIRDS**

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1. INTRODUCTION

The terms of reference for this specialist study are to:

- Identify areas and habitats significant to the conservation of bird species of special interest as identified from the scoping report as well as from additional evaluation of the proposed project,
- Make recommendations towards avoiding or mitigation of potential impacts, whether related to route alignment, road construction or operations, including recommendations regarding post construction rehabilitation,
- Conduct a field and desktop assessment of any impacts that may be identified, without and with proposed avoidance/mitigation measures, using the assessment method provided,
- 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 birds 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.
- Describe habitat improvement for Grey-wing Francolin (Sector 1) so that game bird coveys are enlarged

More than 226 species (Appendix 1) are expected to occur in close association with and in the immediate vicinity of the proposed road. Most of these species have adapted to urban and agricultural development and some have even benefited from such development. Species, which could not adapt due to very restricted habitats, specific habitat requirements or specific habits or characteristics, which limit their ability to live commensally with mankind, have long ago disappeared from the Western Cape Province.

In a regional context it is unlikely that the proposed road will lead to the local extinction of any naturally occurring bird species. Most of the species remaining in the area are mobile and should temporarily disperse during the road building process and recolonize their former habitats after completion of the construction works.

Fragmentation of the natural habitats in the Cape Peninsula is the most serious threat to most species and in this context it can be argued that the proposed road will lead to further fragmentation and would thus be detrimental to most bird species. It can however also be argued that road verges, provided that they are correctly managed, can provide corridors between the isolated fragments of natural habitat (Yanes et al. 1995) and thus improve conditions for survival of some species. Various authors

(Gennard & Williams, 1975, Dickman & Doncaster 1989, Getz et al. 1977, Way 1977) have commented on this aspect but more detailed studies in respect of South African bird species are needed.

In this report each section of the proposed ring road is assessed in terms of the possible impacts on bird species expected to occur or confirmed for that section of the road. Some of the mitigation measures proposed are generic and would also appear in many of the other specialist reports, whereas others are broadly defined due to the fact that detailed design of the proposed road will only be done later.

2. METHODS

Field visits to section three took three days, which included in depth discussions with a number of interested parties, including Messrs Gibb and Dorse (see below), as well as with Mr. Rob Martin. Sections two and three were allocated one day each.

Checklists of the bird fauna expected to occur along the various sections of the proposed R300 extension were compiled by making use of published literature, general field guides and distribution maps such as those of Harrison et al. 1997, Barnes 1998, Barnes 2000, Hockey et al. 1989, and Maclean, 1993. During field visits, the habitat requirements of the species were compared to the availability of suitable habitat in the study area and species were only included in the list if suitable habitat occurred close to the alignment of the proposed road.

Appropriate historical distribution records were difficult to access in the time frame allowed for this consultation, and the main source of information was gleaned from R. Martin pers comm., who not only provided data from his own extensive records, but also from those of the late John Martin.

Distribution records of birds are normally recorded on a quarter degree square, which is considerably less accurate than the scale required for a study of this nature. The exception for the proposed route is the detailed counts conducted on the ponds of the Strandfontein Sewage Works (SSW). The distribution records were therefore augmented with field studies of selected portions of natural vegetation still occurring in the area. During these investigations field signs such as direct observations, droppings, prey remains and the monitoring of calls over long distances was used to confirm the presence of certain species.

Consultations with knowledgeable people in the area also contributed to an understanding of the bird fauna and confirmed the presence or absence of certain species. Most notable of these are:

Mr. Dalton Gibbs –Manager, Rondevlei Nature Reserve
Mr. Clifford Dorse - Manager, Zandvlei Nature Reserve
Mr. Rob Martin – well-known amateur ornithologist

In addition to the above, a number of persons who registered as affected parties were contacted by telephone and interviewed. Their comments and concerns were assimilated in this report.

Furthermore, an extensive literature search was conducted to access the international current best practices for the management of birds in association with

roads. It was surprising that the literature on this subject was much larger than suspected, and the total number of papers and reports exceeded 800. For the sake of brevity and also to focus current best practices, mainly literature published after the early 1980s were assimilated (see literature list). It is of interest to note that southern Africa, or the entire continent for that matter, has made no comparable contribution to this field of research (Dawson 1991).

2.1 Literature consulted:

An analysis of the current literature revealed that the effects of roads on birds range from strong attraction to certain raptors and other animals (Meunier et al. 2000, Anderson et al. 1985, Andren, 1994, Free et al, 1975) to substantial disruption of life cycles in others (van der Zande et al. 1980, Dickerson, 1939, Finnis, 1960, Zande, 1980, Reijnen et al 1995), although it should be remembered that these studies were conducted in open field conditions in Europe, the USA and the United Kingdom (Klein 1993, van der Zande et al. 1980, Sheate, 1990). One general rule seems to apply with most bird species and that is the level of tolerance that is acquired in relation to traffic density. The recent study of Meunier et al. 2000 clearly shows that birds quickly assimilate the movement and noise of traffic as background or ambient noise and afterwards continue with their activities. This phenomenon is clearly illustrated with perching raptors (Black-shouldered Kites, Common Buzzards, kestrels and corvids) along busy roads, which seem to tolerate traffic reasonably well, compared to perching raptors along quiet roads which seem to be easily disturbed by occasional and erratic traffic flow. Extreme examples of tolerance to massive disturbance are those of birds feeding, breeding and roosting on airports across the globe. Species previously considered highly sensitive to disturbances, such as the Peregrine Falcon *Falco peregrinus*, adapts well to extreme anthropogenic environments (Pepler 2000).

This consultant also takes cognisance of the fact that, to certain sections of the public, this development is considered highly contentious and controversial. Strident public reactions have come from the proposed development in Sector 1 (Muizenberg/Zandvlei/Rondevlei/Zeekoevlei/Strandfontein), but rather remarkably, there was hardly any public reaction from the rest of the areas affected by the development. Clearly, the Rondevlei/Strandfontein issue is highly charged, and I suggest that this is understandable since many well-known ornithologists, both professional and amateur, have made substantial contributions to our knowledge of ornithology from studies and observations conducted here. **This is particularly true for Strandfontein, where bird counts over many years have elevated its status to probably the most important wetland in the Cape Peninsula** (Ashkenazi 2001). It is crucial to remember that these are man-made or man-altered (anthropogenic) features, not to be considered as an "island", but as part of a series of bird habitats (which includes natural features such as Rondevlei and Zandvlei) in a "sea" of development (Davies & Day 1998). The regional, national and international importance of this suite of wetlands was discussed in the report by Pepler (1999) "R300 extension/N21 project: desktop study description of fauna: avifauna" submitted to Chand/Ecosense" Joint Venture in 1999, which is still applicable. In the introduction to this report I stated: Phase three however, poses major problems and implications since it penetrates and affects one of the most valuable and famous wetland complexes in the Cape Peninsula. Pepler 1999.

3. SECTOR 1: SOUTHERN GREENFIELDS SECTIONS

3.1 Legislative and institutional contexts for wetlands

There are specific legal or permit requirements relevant to this project and the relevant acts and their individual ramifications are described below. The analysis is from Van Rooijen (2003) and is quoted with kind permission of the author.

DEAT in conjunction with Working for Water has identified a need to rehabilitate degraded wetlands in SA. They decided that a protocol for the rehabilitation of wetlands would be prepared, in the form of a manual, which will eventually form an environmental management system.

Apart from this protocol the question is what is the role of national government and if current SA legislation makes sufficient provision to protect wetlands. A brief overview of the most significant legislation conserving, protecting and rehabilitating wetlands in SA follows. **For purposes of this report not all relevant legislation can be discussed and the focus will be on developments in legislation relating to wetlands.**

3.1.1 The role of national government

Acceding to and ratifying the Ramsar Convention creates a number of international law obligations for national government, which have been assumed by DEAT.

In terms of this obligation, SA has up to date designated 17 wetlands for inclusion on the List of Wetlands. Government is further obliged to formulate and implement their planning so as to promote ..."as far as possible the wise use of wetlands in their territory." The legal meaning of the terms "a wise use" has evolved and developed over the course of the last twenty years and is now equated largely with the notion of sustainable development.

3.1.2 South African Law

3.1.2.1 The Constitution of SA

Section 24 of the SA Constitution contains broad provisions concerning environmental right and state obligations to enforce them. Wetlands are essential to ecological health, which imposes an implied mandate on all organs of State to take reasonable steps to ensure wetland health.

The environmental right imposes obligations on all three spheres of government (national, provincial and local) since it imposes an obligation on the state to adopt reasonable legislative and other measures to uphold the right.

3.1.2.2 The National Water Act

The primary purpose of this Act is to manage and control SA's water resources. Relevant to wetlands are:

- Meeting the basic human needs of present and future generations;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demands for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

In terms of Section 1 (xxix) wetlands is defined to mean a land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Other important provisions in terms of the Act:

- The use of land is also controlled by the Act, which regulates activities, which degrade wetlands.
- Landowners and users have an obligation not to pollute water, and prescribe certain measures to prevent pollution.
- When a bed, bank, course or characteristics of a watercourse is altered, the Act implies that a license has to be obtained.
- The institutional roles of DWAF and the catchments management agencies (CMAs), which are bodies charged with enforcing some aspects of this Act. The CMA may take measures it considers necessary to remedy a harmful situation and may recover all costs incurred. These provisions are extremely powerful in wetland rehabilitation and represent an important source of income or cost recovery (sustainability). However a shortcoming of the Act is that it does not allow CMAs to delegate their powers to other authorities or people e.g. organizations aimed at rehabilitating wetlands.
- The Minister is required to establish national monitoring systems on water resources.

3.1.2.3 National Environment Management Act (NEMA)

This Act is an overarching statute regulating various aspects of natural resource use, integrated environmental management and pollution control. Its definition of the environment includes the land and water of the earth, micro-organisms, plant and animal life or a combination of those things, and the inter relationships among them.

The Act has a number of national environmental management principles, which apply to the actions of all organs of State that may significantly affect the environment. They are the test against which administrative action, which may affect the environment, must be measured. For the purposes of wetland conservation and rehabilitation the following are important:

- Development must be socially, environmentally and economically sustainable.
- Sustainable development requires the consideration of all relevant factors including the following:
 - the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimized and remedied;
 - pollution and degradation of the environment are avoided, or where they cannot be altogether avoided, are minimized and remedied;
 - development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized;
 - a risk-adverse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions or actions;
 - negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimized and remedied;
 - the cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and
 - sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject of significant human resource usage and development pressure.

Apart from these principles which must inform all administrative acts, NEMA creates specific institutional powers which are relevant to wetlands.

Important provisions of the Act relating to wetlands conservation/rehabilitation are:

- The duty of land owners to rehabilitate degraded environments. The provisions impose a primary obligation on land owners to rehabilitate degraded wetlands on their property.
- The Act gives considerable power to specified officials to direct that remediation take place and to recover the cost of rehabilitation (in the event of wrongful human conduct).
- The Act allows civil society to conduct criminal prosecutions if it is in the public interest or in the protection of the environment. A person may institute and conduct a prosecution in respect of a breach or threatened breach of any duty where the duty is concerned with the protection of the environment and a breach of it is an offence. The Act allows a broad category of people to approach a court for relief in respect of any breach or threatened breach in terms of the Act. A court may decide not to award costs against a person or group who fails to obtain the relief sought, provided that the litigant(s) who instituted the action can show that they acted reasonably out of a concern for the public interest or that of the environment and made due efforts to use other means to obtain the relief sought. A public interest group, or NGO may thus take action to protect wetlands, without having to face the threat of an adverse cost order against it.

NEMA contains provisions regarding an obligation to conduct environmental impact assessments for proposed activities, even where they are not those identified by the Minister in terms of section 21 of the Environment Conservation Act (ECA). NEMA provides that where someone proposes to carry out an activity which requires permission or authorization by law and which may significantly affect the environment, that proposed activity must be considered, investigated and assessed prior to implementation and reported to the organ of state charged by law with giving permission. The section makes it clear that the existing EIA regulation remain in force, but that, notwithstanding those, the minimum requirement for investigation and assessment, contained in section 24(7) of NEMA, must be complied with even where an activity is not scheduled under the EIA regulations. They include an obligation to investigate the potential impacts, including cumulative effects of the activity and its alternatives, an investigation into the alternative of not implementing the activity, and reporting on gaps in knowledge and underlying assumptions. These requirements are, in some respects, considerably broader than those required by the EIA regulations. This section also has important implications for activities, which are likely to affect wetlands negatively and which are currently not subject to the EIA regulations, for example mining.

3.1.2.4 The Environment Conservation Act

This Act has to a large extent been repealed and replaced by NEMA. The most important remaining provisions of this Act are those concerning the power of certain officials to require remediation and the Environmental Impact Assessment Regulations. This is very important when wetlands may be affected by any proposed activity.

In terms of the ECA, the Minister of Environmental Affairs and Tourism is entitled to identify activities, which may have a substantial detrimental effect on the environment. No one may carry out such an activity without the prior written permission of a competent authority. Permission may not be granted without compliance with (or exemption from) the EIA regulations. The regulations apply to all identified activities. The Minister has identified a list of activities. The important activities for the purpose of wetland degradation and rehabilitation are as follows:

- The construction of upgrading of:
 - Roads and associated structures outside the borders of town planning schemes;
 - Canals and channels, including diversion of the normal flow of water in a riverbed and impoundments;
 - Dams, levies, or weirs affecting the flow of the river;
 - Schemes for abstraction or utilization of ground or surface water for bulk supply purposes.
- The intensive husbandry of, or importation of any plant or animal that has been declared a weed or alien invasive species;
- The reclamation of land below the high-water mark of the sea and in inland water including wetlands;
- Defined change(s) of land use.

The EIA regulations contain a number of procedural and substantive requirements, including an obligation to complete a scoping report, which must include a brief project description, a description of how the environment may be affected, a

description of environmental issues identified and a description of all alternatives identified. An applicant is also required to ensure adequate public participation in the process. Where the impact is likely to be a particularly significant one, the applicant will be required to conduct a full environmental impact assessment.

3.1.2.5 National Environmental Management Biodiversity Bill

The Bill promotes management, conservation and sustainable use of indigenous biological resources, and provides for:

- (a) (i) the management and conservation of biological diversity within the Republic;
(ii) the use of indigenous biological resources in a sustainable manner; and
(iii) the fair and equitable sharing of benefits arising from the commercialization through bioprospecting of traditional uses and knowledge of generic resources.
- (b) To give effect to international agreements relating to biodiversity which are binding on the Republic;
- (c) To provide for co-operative governance in biodiversity management and conservation; and
- (d) To provide for a National Biodiversity Institute to assist in achieving the above objects.

The Act gives wide powers to a National Biodiversity Institute to inter alia protect animals and micro-organisms in appropriate enclosures, the collection of information, undertaking and promotion of research on indigenous biodiversity and the sustainable use of indigenous biological resources, the prevention, control or eradication of listed invasive species, biodiversity planning and other functions.

The implementation of this Bill will have a substantial impact on the protection and conservation of species animals, plants and organism associated with wetlands and the protection against invasive species.

3.1.2.6 The Conservation of Agricultural Resources Act

The main focus of this act is upon agricultural resources but it has an indirect implication for wetlands. It is one of the primary statutes through which agricultural activities which negatively affect wetlands may be regulated. Of particular importance are the promulgated regulations. The Act regulates rehabilitation of wetlands insofar as that activity falls under the definition of conservation which, in relation to the natural agricultural resources, includes the protection, recovery and reclamation of those resources.

The Minister of Agriculture may prescribe control measures with which all land users must comply. Relevant to wetlands are:

- The irrigation of land;
- The prevention or control of water logging or salination of land;
- The utilization and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulation of the flow pattern of run-off water;
- The utilization and protection of vegetation;
- The control of weeds and invader plants;

- The protection of water sources against pollution on account of farming practices; and
- Any other matter, which the Minister may deem necessary or expedient in order to achieve the object of the Act.

The effect of the regulations is further to place a duty on land users to control weeds and invader plants in certain identified areas, which may in some cases, include wetlands.

A vexed question concerns the extent to which the definition of "wetlands" includes estuaries, as this impinges on the jurisdiction of those authorities that administer the Sea Shore Act 21 of 1935.

3.1.2.7 The Development Facilitation Act

This act sets the overall framework and administrative structures for planning throughout the country. It is intended to be a framework law which allows provinces to pass provincial planning laws and regulations that are appropriate for specific circumstances.

The objective of this act is to introduce extraordinary measures to facilitate and speed up the implementation of reconstruction and development programs and projects in relation to land and lays down general principles governing land development through SA.

The Act contains general principles for land development and conflict resolution Relevant to wetlands are the following:

- Policy, administrative practice and laws should promote efficient and integrated land development in that they:
 - Promote the integration of the social, economic, institutional and physical aspects of land development;
 - Promote integrated land development in rural and urban areas in support of each other; and
 - Encourage environmentally sustainable land development practices and processes.
- Further more the Act requires that policy, administrative practice and laws should promote sustainable land development at the required scale in that they should:
 - Promote land development which is within the fiscal, institutional and administrative means of the Republic;
 - Promote the establishment of viable communities;
 - Promote sustained protection of the environment; and
 - Meet the basic needs of all citizens in an affordable way.

Care should be taken that each proposed land development area should be judged on its own merits and that no particular use of land, be it residential, commercial, conservational, industrial, mining, agricultural, community development, public use etc. should in advance or in general be regarded as being less important or desirable than any other use of land.

3.2 The envisages impacts

This sector of the proposed road from the Westlake Intersection to the Mitchell's Plain Intersection, where the existing R300 starts, is the most critical sector in terms of the biophysical environment and ecological integrity in general. In this sector the alignment of the proposed road traverse some important wetlands and proclaimed nature reserves such as the Zandvlei Nature Reserve, Zeekoevlei Nature Reserve and the Strandfontein Sewerage Works. The integrity of the envisaged False Bay Coastal Park will also be compromised by the present alignment of the road.

Although the alignment of the proposed road is mostly through areas affected by urbanization and alien vegetation infestations, the present routing will affect important wetlands such as the Zandvlei Nature Reserve, Zeekoevlei Nature Reserve, Rondevlei Nature Reserve and the Strandfontein Sewerage Works.

The bird species expected in this section are summarized in the species list for Rondevlei. It would be reasonable to assume that, with the exception of vagrants and rare over-flights, this list would hold true for this entire section.

3.3 List of impacts:

- 1 The interruption of "natural" water flow, where existing water bodies are traversed by new constructions
- 2 The interruption of the surface movement of water birds
- 3 Bird collisions with lights illuminating these structures at night
- 4 Noise effects on sensitive species
- 5 The visual impact of the construction
- 6 The harmful effects of toxic releases due to accidents on this section.
- 7 The displacement of game bird coveys
- 8 The disruption of flight paths between water bodies
- 9 Species diversity losses due to habitat destruction and fragmentation
- 10 Birds hit by cars

3.3.1 The interruption of "natural" water flow, where existing water bodies are traversed by new constructions

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	M	L	L	M
With Mitigation	L	L	L	M	L	L	M

Recommendations

Mitigation

- Observations during the three site visits suggest that there is very little "mixing" of the water in the settlement ponds, except perhaps for some surface agitation during periods of high winds. Nevertheless, it would be prudent to allow for maximum mixing of wastewater where the proposed structure will cross these ponds. The recommendations for the mammalian study holds true here the sections that are bridged should therefore be of a span that combines practicality with structural constraints. These constraints will largely be dictated by the recommendations of the aesthetics consultants and structural engineers.

3.3.2 The interruption of the surface movement of water birds

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	H	M	M	M	M	M	M
With Mitigation	M	L	L	L	L	L	M

Recommendations:

Mitigation:

- The same criteria for "interruption of natural water flow" apply here.
- The underpasses should obviously need to be of sufficient height to allow water birds traveling on the surface to forge the openings without feeling intimidated by either the surrounding construction or by the visual limitations produced by the bridging. The prescriptions for the mammalian study should prove adequate, and this is certainly in excess of the underpasses provided on the Knysna lagoon, where water birds have become fully habituated to both the road structure and the underpasses. An example of a successful underpass is that of the Berg River Mouth Bridge.

3.3.3 Bird collisions with lights illuminating these structures at night

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	L	L	L	M
With Mitigation	L	L	L	L	M	L	H

Recommendations:

Mitigation

- Although not considered a critical problem, it is suggested that the design engineers consider a unique approach to lighting the approaches to the crossing as well as the crossing in a way that the illumination structures are kept just above road level (Buchanan 1993) rather than on standard poles. There is evidence that, especially when migrants arrive after long migration flights, they may be easily confused by strong lights, and may expend additional energy milling about. Spotted eagle Owls are also attracted to high street lighting structures and will be exposed to traffic if they hunt on the open road surfaces.

3.3.4 Noise effects on sensitive species

It is well known that birds habituate readily to constant ambient noise, but intermittent noises tend to affect some species more than others (Bowles 1995, Foppen & Reijnen 1994, Trimper et al. 1998). This will be particularly true during the construction phase of the development. Species that may be susceptible to noise and disturbance in the study area have been marked on the Rondevlei species list. Circumstantial evidence suggest that water birds may generally be more

sensitive to ambient noises, but then the previously quoted examples of the Knysna Lagoon, the Berg River Mouth crossing, roads around the Verlorenvlei and others, clearly illustrate that birds can live quite normal lives near sources of intense audio disturbance. The classic example of birds on very busy airports such as Heathrow and Charles de Gaulle show that some species are highly tolerant to movement and disturbance.

It is predicted that the initial response of birds to construction disturbance will be fairly dramatic and obvious, with the possibility of some species abandoning the immediate vicinity of the activity. Once construction has ceased, these birds will return, and depending on the intensity of mitigation, might even increase their numbers.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	L	L	L	L	L	M
With Mitigation	L	L	L	M	L	L	H

Recommendations:

Mitigation

- Even if it can be proved that noise is not a limiting factor for birds utilizing the affected areas, it is nevertheless suggested that noise barriers be fitted to the approaches as well as the entire length of the construction through the wetland area, a distance of roughly four kilometers. A thorough literature and Internet search produced a huge number of designs, ranging widely in cost and efficiency. Some of the designs such as ones from Sweden and the USA, cost in the order of >R2000/m, and is constructed from rare metals and polycarbonate panels. Given the current levels of vandalism experiences in southern Africa, these high technology designs are deemed prohibitive in price and susceptible to damage by humans.
- Given the constraints of price and efficiency, it is the consultant's suggestion that the most effective and visually pleasing mitigation would be to earth bank both sides of the road through this area and to plant them with appropriate vegetation. This structure will serve a number of important purposes. It will mask and soften the visual impact of the construction, provide suitable breeding resting and feeding habitat for birds on the outsides of the banks, and most importantly, provide physical barriers along the road in the case of an accidental release of chemicals whilst on this section. Both the reserve managers from Zandvlei and Rondevlei conceded that this option appeared to be the most acceptable in the event of the construction going ahead in this area. Discussions with the developers have also gained their commitment to having a system of patrol vehicles escorting carriers of dangerous chemicals as they cross the wetland areas.

3.3.5 The visual impact of the construction

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	H	H	M	H	H	H	H
With Mitigation	M	L	L	M	M	M	M

Recommendations:

See section dealing with Noise Effects

3.3.6 The harmful effects of toxic releases due to accidents on this section

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	H	M	H	L	M	L	M
With Mitigation	M	L	M	L	M	L	M

The possibility of a catastrophic release of hazardous substances into the aquatic system is a more serious impact in this sector of the development due to the widespread pollution effect in the adjoining water bodies. I am in agreement with Harding (2002) that the probability of such an event is extremely low and that a similar spill upstream will reach the wetland via the storm water system. Although it would be considered unreasonable and perhaps impossible for developers to create impenetrable physical barriers, it has been agreed that toxic cargo will be escorted across any land bridges near wetlands by the concession holder. Furthermore, oil traps of sufficient capacity must be constructed on every wetland overpass.

Recommendations:

- As mentioned above, all dangerous or toxic cargo must be escorted across the wetland area in vehicles that are clearly marked with bold signs, flags and flashing lights.
- In addition, a rapid response unit must be based at **all** toll plazas that will ensure that appropriate and timeous action can be taken.
- Oil traps of sufficient capacity must be installed on every wetland overpass along the entire route, and,
- In the case of the proposed earth banking, appropriate structures must be engineered in order to disperse accidental spills between such earth banks.

3.3.7 The displacement of game bird coveys

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	M	H	M	M	M
With Mitigation	L	L	L	L	L	L	M

Recommendations:

Mitigation

- The fact that Greywing Francolin *Francolinus africanus* is still present in this area is surprising and exceptional. Generally, they are highly sensitive to disturbance and in this case it would seem that the remnant populations have become habituated to suburban disturbance. Every effort should be made to secure the future viability of these remnant populations, as was suggested in the scoping report.
- Since Greywing Francolins feed mostly on the underground storage organs of geophytes, it is important to manage the area for the optimal production of such plants. The key to the sustained production of these plants is to keep the vegetation fairly short, either by burning or by mowing. Although burning is not usually considered a management option for road verges, it is strongly suggested that it be considered in the relatively contained area (2kms) between Lakeside and Lavender Hill
- It is suggested that shelter and breeding belts be planted along the outer edges of the road reserve. Species suitable for such shelter belts are Bitou *Crisanthemoides* spp, Cotoneaster *Cotoneaster* spp. (provides extra protection because of its thorns) or, the most ideal species will be Num-num (*Carissa bispinosa*) which combines attractive foliage colour with scented flowers, edible fruit and thorns for protection.
- At least two permanent water features must be supplied, with a spacing to be finalized after the construction phase. . These could be in the form of seepages, small pools or gallinaceous guzzlers as described in Giles (1969).

3.3.8 The disruption of flight paths between water bodies

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	M	M	L	M
With Mitigation	L	L	L	L	L	L	H

Recommendations

Mitigation

- Should the consultant's recommendation of the earth banking of the section through the wetlands be accepted, the flight behaviour of birds should not be affected at all since the mitigated section will simply become assimilated in the general background landscape. For species that fly very low, such as Dabchick, the three meter bridged areas will offer adequate headroom (Keller et al. 1996,

Keller 1991). Earth banking will also eliminate most of the effects of lighting on night flying and migrant species.

3.3.9 Species diversity losses due to habitat destruction and fragmentation

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	M	M	M	M
With Mitigation	L	L	L	L	L	L	H

Recommendations

Mitigation

- World-wide the Barn Owl *Typo alba* has suffered dramatic population reductions due to habitat loss and poisoning of its vertebrate prey. It is highly adaptable to urban existence and, for example, the town of Stellenbosch has eight known breeding pairs. Sandy road verges usually supply abundant prey in the form of Cape Gerbils *Tatera afra*, and two pairs of Barn Owl living in aircraft hangers on the Stellenbosch airfield live off this species exclusively. Inexpensive nest boxes (see Figure 21) can be permanently fixed on any stable structure higher than four meters high, which overlooks open spaces (see site photograph Figure 4, 6, 7 and figure 8, the road reserve in Steenberg, Section 1). Once occupied, these owls quickly assume "celebrity" status, and many interesting and educational school projects can be constructed from the analysis of prey remains.
- Rock Kestrels *Falco tinnunculus* are opportunistic breeders that will occupy nesting ledges and boxes on any man-made structure. Recent examples of successful breeding on the Peninsula are the birds on the Tygerberg Hospital, the Cape Town International airport hanger pair and four known pairs on farm buildings in the Durbanville area. The placement of the nest boxes would be the same as for the Barn Owl boxes and a good example for placement would be Figure 4 and for the design see Figure 21 and 21a.
- The tall concrete structures associated with road flyovers, bridges and bypasses offer ideal nesting opportunity for swifts, swallows and martins. Unfortunately these designs never take the nesting requirements of these birds into consideration and it is now suggested that slight textural adjustments be made to new structures in order to accommodate nests.
- The management of bat populations in urban environments is receiving increasing attention around the world as populations of once common species decline due to habitat destruction. Figures 19 and 20 show bat houses that can be fitted to road bridges, and Figure 20a shows bat houses for free standing buildings)
- Consultation will be held with design engineers to incorporate the required bird nesting structures in the final structure.
- To compensate for the loss of water surface, it is suggested that, within the limits of sewage pond function, a number of artificial islands should be constructed. Added to the greatly increased edge effect of having the road, islands would substantially increase the carrying capacity of the system.
- When choices are made for the rehabilitation of temporary damage caused by construction, plant species should be selected in close consultation with both the

consulting botanist and ornithologist. The system's carrying capacity can be increased substantially by creating the right mixture of shelter and nesting niches.

3.3.10 Birds hit by vehicles

A peer review consultant required that the possibilities of birds killed by traffic should be discussed. In my experience, road kills of birds by vehicles are largely restricted to owls, nightjars and low flying ground birds such as guinea fowl and francolins. The mortality of owls in urban areas are naturally higher due to vehicle strikes since the birds commonly use lamp poles as hunting perches whilst looking for commensal rodents

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	L	M	L	L
With Mitigation	L	L	L	L	L	L	L

Recommendations

Mitigation will be the same as for 3.3.3, Bird collisions with lights illuminating these structures at night.

3.4 General Recommendations for Sector 1

- During the construction phase specific measures should be implemented to limit any physical damage to the minimum area possible. This would entail fencing off areas of importance and rigorous enforcement by the Environmental Site Officer.
- Access between the various water bodies i.e. Zeekoeivlei Nature Reserve and the Strandfontein Sewerage Works should be ensured by bridging rather than continuous filling. Studies in the United States and Central Spain (Reed et al 1975, Reed 1981, Yanes et al 1995 and Foster & Humphrey 1995) have shown that a variety of mammal species such as panthers, bobcats, black bears, deer, raccoon, alligators, genets etc. readily use underpasses on a four-lane divided highway of up to 48,5 meters wide. No specific studies on South African bird species could be found but there should be no reason why they should not react in a similar way.
- It is of critical importance in the construction of such underpasses are the maximum width and height. Underpasses in this section should therefore be of the maximum length allowed within the engineering constraints and at least 3,0 meters high.
- Despite the fact that both the Zeekoeivlei and Strandfontein Sewerage Works are heavily polluted and eutrophic, care should be taken in the design of the road in this sector to prevent additional pollution from oil on the roads and accidental spills of chemicals. Making provision in the design of the road to dispose of storm water runoff should achieve this and accidental spills at predetermined less sensitive points. This should be regarded as a generic mitigation measure to be applied in all cases where the road traverses wetlands or streams.
- Storage of sand, cement, fuel, tarmac and other hazardous materials should be at predetermined sites where the danger of leaching into watercourses can be kept at a minimum or completely prevented.

- The locations of borrow pits and quarries should be critically selected to cause minimum environmental damage.
- An Environmental Site Officer (ESO) should be appointed for the duration of the construction and rehabilitation phases of the project to ensure compliance with the environmental prescriptions and recommendations.
- Regular environmental training should be given to construction workers during the construction phase to ensure that individuals of the various taxa affected are properly translocated and not killed.
- The re-establishment of indigenous vegetation for rehabilitation of the road verges should be encouraged. Exotic vegetation and specifically invasive species should not be allowed. Pesticides and herbicides should not be allowed in the management of road verges. Burning of the road verges to create patches of uneven aged vegetation should be promoted to allow for a mosaic of habitats to promote dispersal of the various

4. SECTOR 2: EXISTING N21/R300

This sector is already built between the Swartklip Interchange on the N2 and the Stellenberg Interchange on the N1 and was therefore not assessed. Although not addressed in the consulting brief and terms of reference, it is strongly suggested that, where applicable, the mitigation measures as described for all impacts addressed in this study should be implemented where appropriate.

5. SECTOR 3: HIGHWAY SECTION 6

This sector from the Stellenberg Interchange on the N1 to Wellington Road in Durbanville is located within an area that is fully urbanized and extensively altered. The actual routing of the proposed road is hemmed in by residential developments and in fact fenced off with vibracrete walls. Little direct ecological impact by the road is expected in this sector.

5.1 Species and habitats

Immediately to the west between the N2 and De Villiers Road remnants of wetlands (see Figure 1) still occur albeit extensively invaded by alien plant species. Storm water spillage, solid waste disposal and grazing by cattle contribute to the disturbances in the area. These wetlands however still support a surprising number of bird species. Although a complete species list for this habitat would be much more comprehensive, the following species are expected to occur commonly in this area with those confirmed species indicated with an asterisk are:

*Little Egret	<i>Egretta garzetta</i>
*Cattle Egret	<i>Bulbulcus ibis</i>
Hamerkop	<i>Scopus umbretta</i>
*Sacred Ibis	<i>Threskiornis aethiopicus</i>
*Hadedda Ibis	<i>Bostrychia hagedash</i>
Blackshouldered Kite	<i>Elanus caeruleus</i>
*Cape Francolin	<i>Francolinus capensis</i>
*Helmeted Guineafowl	<i>Numidia meglearis</i>
*Crowned Plover	<i>Vanellus coronatus</i>
Spotted Dikkop	<i>Burhinus capensis</i>
*Feral Pigeon	<i>Columba livea</i>

*Rock Pigeon	<i>Columba guinea</i>
*Redeyed Dove	<i>Streptopelia semitorquata</i>
*Cape Turtle Dove	<i>Streptopelia capensis</i>
*Laughing Dove	<i>Sterptopelia senegalensis</i>
Spotted Eagle Owl	<i>Bubo capensis</i>
*Little Swift	<i>Apus affinus</i>
Whitebacked Mousebird	<i>Colius colius</i>
African Hoopoe	<i>Upupa epops</i>
*Greater Striped Swallow	<i>Hirundo cucullata</i>
*Pied Crow	<i>Corvus albus</i>
Cape Bulbul	<i>Pycnonotus capensis</i>
Olive Thrush	<i>Turdus olivaceus</i>
*Cape Robin	<i>Cossypha caffra</i>
*Spotted Prinnia	<i>Prinia hypoxantha</i>
Cape Wagtail	<i>Motacilla capensis</i>
*Fiscal Shrike	<i>Lanius collarus</i>
*European Starling	<i>Sturnus vulgarus</i>
*House Sparrow	<i>Passer domesticus</i>
*Cape Sparrow	<i>Passer melanuris</i>
Cape Weaver	<i>Ploceus capensis</i>
Masked Weaver	<i>Ploceus velatus</i>
Red Bishop	<i>Euplectes orix</i>
*Cape Canary	<i>Serinus canicollis</i>

5.2 Expected impacts

No impact of any significance is foreseen in this stage of the development. None of the bird species expected to occur is rare or endangered or even scarce and are all well adapted to urbanization.

The possibility of major hazardous material spills during the operational phase could however have implications for the remaining wetland habitat, west of the proposed road and affect the vertebrate populations as no suitable refugia exist for the bird populations present.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	L	L	L	M
With Mitigation	L	L	L	L	L	L	M

Recommendations

5.3 Mitigation

Provision should be made in the design to avoid any accidental spillage of hazardous materials or oil runoff from the road from entering sensitive wetlands.

The re-establishment of indigenous vegetation for rehabilitation of the road verges should be encouraged. Exotic vegetation and specifically invasive species should not be allowed. Pesticides and herbicides should not be allowed in the management of

road verges. Burning of the road verges to create patches of uneven aged vegetation should be promoted to allow for a mosaic of habitats to promote dispersal of the various species.

6 SECTOR 3: HIGHWAY SECTION 7

The routing of the proposed road in this section is from Wellington Road, through agricultural land to the intersection with the N7/Vissershok Interchange. This phase of the development will take place in habitats which have been converted extensively by man. Most of the natural habitat found in this sector has been converted to agriculture, with winter wheat, vineyards and dairy farming the predominant forms of agriculture.

6.1 Species and habitats

The most important habitat for birds in this section is some ephemeral wetlands and remnants of renosterveld still remaining within the agriculturally dominated land. Bird species expected to occur, with those confirmed marked with an asterisk, are:

Blackheaded Heron	<i>Ardea melanocephala</i>
*Little Egret	<i>Egretta garzetta</i>
*Cattle Egret	<i>Bubulcus ibis</i>
Hamerkop	<i>Scopus umbretta</i>
*Sacred Ibis	<i>Threskiornis aethiopicus</i>
*Cape Francolin	<i>Francolinus capensis</i>
*Hadedda Ibis	<i>Bostrychia hagedash</i>
Egyptian Goose	<i>Alopochen aegyptiacus</i>
Spurwinged Goose	<i>Plectropterus gambensis</i>
Steppe Buzzard	<i>Buteo buteo</i>
*Blackshouldered Kite	<i>Elanus caeruleus</i>
*Rock Kestrel	<i>Falco tinnunculus</i>
Common Quail	<i>Coturnix coturnix</i>
Helmeted Guineafowl	<i>Numidia meleagris</i>
Crowned Plover	<i>Vanellus coronatus</i>
Spotted Dikkop	<i>Burhinus capensis</i>
Feral Pigeon	<i>Columba livea</i>
Rock Pigeon	<i>Columba guinea</i>
Redeyed Dove	<i>Streptopelia semitorquata</i>
*Cape Turtle Dove	<i>Streptopelia capicola</i>
*Laughing Dove	<i>Sterptopelia senegalensis</i>
Barn Owl	<i>Tyto alba</i>
Spotted Eagle Owl	<i>Bubo africanus</i>
Fierynecked Nightjar	<i>Caprimulgus pectoralis</i>
Black Swift	<i>Apus barbatus</i>
Little Swift	<i>Apus affinus</i>
Alpine Swift	<i>Apus melba</i>
Whitebacked Mousebird	<i>Colius colius</i>
African Hoopoe	<i>Upupa africana</i>
Clapper Lark	<i>Mirafrapiata</i>
Longbilled Lark	<i>Mirafracurvirostris</i>
Thickbilled Lark	<i>Galeridamagnirostris</i>
Eurasian Swallow	<i>Hirundo rustica</i>

Greater Striped Swallow	Hirundo cucullata
Rock Martin	Hirundo fuligula
Black Crow	Corvus capensis
Pied Crow	Corvus albus
Whitenecked Raven	Corvus albicollis
Capped Wheatear	Oenanthe pileata
Stonechat	Saxicola torquata
Fantailed Cisticola	Cisticola juncidis
Grassveld Pipit	Anthus cinnamomeus
Fiscal Shrike	Lanius collaris
Eurasian Starling	Sturnus vulgarus
House Sparrow	Passer domesticus
Cape Sparrow	Passer melanuris
Cape Weaver	Ploceus capensis
Masked Weaver	Ploceus velatus
Red Bishop	Euplectes orix
Cape Canary	Serinus canicollis
Yellow Canary	Serinus flaviventris

6.2 Expected impacts

Where the proposed road cross ephemeral wetlands (see Figure 25, Anon 1979, Anon 1995), important habitat for birds will be lost. The same prediction holds true for consolidated patches of Renosterveld. The mitigation for this section should be read in close concert with those of the consulting botanist as well as the consulting herpetologist. No other impact of any significance is foreseen for this section of the proposed road.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	M	M	L	M
With Mitigation	L	L	L	L	L	M	M

Recommendations

6.3 Mitigation

Provision must be made to allow underpass access to birds where wetlands are traversed or where continuous patches of natural vegetation are bisected. The design should allow for maximum width of such underpasses as is consistent with engineering constraints and a minimum height of about 3 meters should be maintained

Provision should be made in the design of the road shoulder at important wetland crossings to avoid any oil accumulations or hazardous material spills to end up in such wetlands.

- The re-establishment of indigenous vegetation for rehabilitation of the road verges should be encouraged
- Exotic vegetation and specifically invasive species should not be allowed

- Pesticides and herbicides should not be allowed in the management of road verges
- Burning of the road verges to create patches of uneven aged vegetation should be promoted to allow for a mosaic of habitats to promote dispersal of the various species.

7. SECTOR 3: HIGHWAY SECTION 8

The routing of the proposed road in this section is from the N7/Vissershok Interchange, through mainly agricultural land to the Otto du Plessis Road (M14). This phase of the development will also take place in habitats, which have been converted extensively by man.

7.1 Species and habitats

Blackheaded Heron	<i>Ardea melanocephala</i>
*Little Egret	<i>Egretta garzetta</i>
*Cattle Egret	<i>Bubulcus ibis</i>
Hamerkop	<i>Scopus umbretta</i>
*Sacred Ibis	<i>Threskiornis aethiopicus</i>
*Cape Francolin	<i>Fringilla capensis</i>
*Hadedda Ibis	<i>Bostrychia hagedash</i>
Egyptian Goose	<i>Alopochen aegyptiacus</i>
Spurwinged Goose	<i>Plectropterus gambensis</i>
Steppe Buzzard	<i>Buteo buteo</i>
*Blackshouldered Kite	<i>Elanus caeruleus</i>
*Rock Kestrel	<i>Falco tinnunculus</i>
Common Quail	<i>Coturnix coturnix</i>
Helmeted Guineafowl	<i>Numidia meleagris</i>
Crowned Plover	<i>Vanellus coronatus</i>
Spotted Dikkop	<i>Burhinus capensis</i>
Feral Pigeon	<i>Columba livea</i>
Rock Pigeon	<i>Columba guinea</i>
Redeyed Dove	<i>Streptopelia semitorquata</i>
*Cape Turtle Dove	<i>Streptopelia capicola</i>
*Laughing Dove	<i>Sterptopelia senegalensis</i>
Barn Owl	<i>Tyto alba</i>
Spotted Eagle Owl	<i>Bubo africanus</i>
Fierynecked Nightjar	<i>Caprimulgus pectoralis</i>
Black Swift	<i>Apus barbatus</i>
Little Swift	<i>Apus affinis</i>
Alpine Swift	<i>Apus melba</i>
Whitebacked Mousebird	<i>Colius colius</i>
African Hoopoe	<i>Upupa epops</i>
Clapper Lark	<i>Mirafraga apiata</i>
Longbilled Lark	<i>Mirafraga curvirostris</i>
Thickbilled Lark	<i>Galerida magnirostris</i>
Eurasian Swallow	<i>Hirundo rustica</i>
Greater Striped Swallow	<i>Hirundo cucullata</i>
Rock Martin	<i>Hirundo fuligula</i>
Black Crow	<i>Corvus capensis</i>
Pied Crow	<i>Corvus albus</i>

Whitenecked Raven	Corvus albicollis
Capped Wheatear	Oenanthe pileata
Stonechat	Saxicola torquata
Fantailed Cisticola	Cisticola juncidis
Grassveld Pipit	Anthus cinnamomeus
Fiscal Shrike	Lanius collarus
Eurasian Starling	Sturnus vulgarus
House Sparrow	Passer domesticus
Cape Sparrow	Passer melanurus
Cape Weaver	Ploceus capensis
Masked Weaver	Ploceus velatus
Red Bishop	Euplectes orix
Cape Canary	Serinus canicollis
Yellow Canary	Serinus flaviventris

7.2 **Expected impacts**

Where the proposed road crosses ephemeral wetlands (see Figure 25), important seasonal habitat for birds may be lost. The same prediction holds true for consolidated patches of Renosterveld. The mitigation for this section should be read in close concert with those of the consulting botanist as well as the consulting herpetologist. No other impact of any significance is foreseen for this section of the proposed road.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	M	L	L	M
With Mitigation	L	L	L	L	L	M	M

Recommendations

7.3 **Mitigation**

This will be the same as for 6.4. In the case of Barn Owls which are displaced from old buildings that may have to be demolished, artificial nest boxes can be constructed and placed in close vicinity of the destroyed nest. The rate of transfer to the new nest box is highly predictable. Designs can be obtained from this consultant, or from the internet, where it can be easily sourced.

8. **SECTOR 4 :STELLENBERG INTERCHANGE**

This sector will entail the construction of an elevated interchange at the end of the existing R300 and the beginning of Sector 3: Highway Section 6. The area is extensively converted and little natural habitat remains.

8.1 **Species and habitats**

Directly to the west of the intersection small patches of wetland, albeit in a degraded state, still exist. The area is dominated by bulrushes (*Typha* species), fluitjiesriet (*Phragmites australis*) and vleibos (*Cliffortia strobilifera*) but invasive alien plants such

as Port Jackson (*Acacia saligna*) also abound. These wetlands should support the same bird species as those in Sector 3: Highway Section 6 i.e:

*Little Egret	<i>Egretta garzetta</i>
*Cattle Egret	<i>Bubulcus ibis</i>
Hamerkop	<i>Scopus umbretta</i>
*Sacred Ibis	<i>Threskiornis aethiopicus</i>
*Hadedda Ibis	<i>Bostrychia hagedash</i>
Blackshouldered Kite	<i>Elanus caeruleus</i>
*Cape Francolin	<i>Francolinus capensis</i>
*Helmeted Guineafowl	<i>Numidia meleagris</i>
*Crowned Plover	<i>Vanellus coronatus</i>
Spotted Dikkop	<i>Burhinus capensis</i>
*Feral Pigeon	<i>Columba livea</i>
*Rock Pigeon	<i>Columba guinea</i>
*Redeyed Dove	<i>Streptopelia semitorquata</i>
*Cape Turtle Dove	<i>Streptopelia capicola</i>
*Laughing Dove	<i>Streptopelia senegalensis</i>
Spotted Eagle Owl	<i>Bubo africanus</i>
*Little Swift	<i>Apus affinus</i>
Whitebacked Mousebird	<i>Colius colius</i>
African Hoopoe	<i>Upupa epops</i>
*Greater Striped Swallow	<i>Hirundo cucullata</i>
*Pied Crow	<i>Corvus albus</i>
Cape Bulbul	<i>Pycnonotus capensis</i>
Olive Thrush	<i>Turdus olivaceus</i>
*Cape Robin	<i>Cossypha caffra</i>
*Spotted Prinnia	<i>Prinia hypoxantha</i>
Cape Wagtail	<i>Motacilla capensis</i>
*Fiscal Shrike	<i>Lanius collaris</i>
*European Starling	<i>Sturnus vulgaris</i>
*House Sparrow	<i>Passer domesticus</i>
*Cape Sparrow	<i>Passer melanuris</i>
Cape Weaver	<i>Ploceus capensis</i>
Masked Weaver	<i>Ploceus velatus</i>
Red Bishop	<i>Euplectes orix</i>
*Cape Canary	<i>Serinus canicollis</i>

8.2 Expected impacts

No impact of any significance is foreseen in this stage of the development. None of the bird species expected to occur are rare or endangered or even scarce and are well adapted to urbanization.

The possibility of major hazardous material spills during the operational phase could however have implications for the remaining wetland habitat and affect the vertebrate populations.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	M	L	L	M
With Mitigation	L	L	L	L	L	M	M

Recommendations

8.3 Mitigation

8.4.1 Provision should be made in the design to avoid any accidental spillage of hazardous materials or oil runoff from the road from entering sensitive wetlands.

8.4.2 The broad scale mitigation as described in 3.4 holds true here and there is no need to repeat them.

9 CUMULATIVE IMPACTS

This consultant takes full cognizance of the fact that Sector One appears to pose a serious predicament with affected and concerned parties, as well as members of the public. The reasons for this show of interest are complex and possibly clouded with emotive issues.

9.1 There will be inevitable loss or fragmentation of habitats, both urban and rural, where the road will be constructed (Anderson et al. 1994).

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	L	L	L	M
With Mitigation	L	L	L	L	L	M	M

Recommendations

The full implementation of the entire suite of mitigation measures spanning the reports submitted by all specialists will result in a controlled and managed urban habitat.

9.2 With time, effluent from the roads such as detritus from brake linings, petrochemical metabolites and littering from moving vehicles, will subtly change the environmental footprint of the road system. Its environmental effects will be extremely difficult to predict, or even to model accurately (Albasel & Cottenie 1985).

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	M	L	L	M
With Mitigation	L	L	L	L	L	M	M

Recommendations

It is practically impossible to predict the cumulative effects of this impact, but a permanent monitoring system for biotic and abiotic parameters will demonstrate these changes in the medium term at least. Invertebrate indicator species such as insects may prove to be the most valuable.

9.3 As far as birds are concerned it is regrettable that there may be a loss of population(s) in some places.

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	HL	H	M	H	M	M	M
With Mitigation	M	M	L	M	M	M	M

Recommendations

This impact relates to individuals such as woodpeckers or owls that may have their specific nest site destroyed by the development. It would be practically impossible to avoid this unfortunate occurrence in some cases, but, as suggested above, the entire suite of mitigation measures may compensate at the landscape level.

9.4 The spread of exotic weeds along road development may attract bird species previously absent from the area affected (Amor & Stevens 1976).

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	M	M	L	L	L	L	M
With Mitigation	L	L	L	L	L	L	M

Recommendations

Good housekeeping of the concession holders of the road will keep exotics in check, and encourage the re-establishment of indigenous or selected plant species. This is not considered a serious problem.

9.5 Should the proposed rehabilitation and mitigation procedures be followed by the developer, birds occurring in these areas may be exposed to impacts (strikes) by vehicles, but this would be considered a normal risk associated for urban birds. (Banks 1979, Glue et al. 1971, Harding 1986, Massemin et al. 1998, Dhinsa 1988, Dunforth & Errington 1964, Finnis 1960).

Assessment

	Extent	Duration	Intensity	Probability	Consequence	Significance	Confidence
Without Mitigation	L	L	L	L	L	L	M
With Mitigation	L	L	L	L	L	L	M

Recommendations

There is little that can be done to avoid bird strikes by moving vehicles. Should the final designs for underpasses, appropriate lighting etc. be fully implemented, it will contribute to a lessening of such mortality

10. SUMMARY OF MITIGATION AND REHABILITATION REQUIREMENTS

The recommendation in this section is taken over from and in conjunction with the mammalian study, with kind permission of the author, Mr. K. Jooste.

10.1 Design:

10.1.1 Provision must be made to allow underpass access to birds where wetlands are traversed or where continuous patches of natural vegetation are bisected. The design should allow for maximum width of such underpasses as is consistent with engineering constraints and minimum height of about 3 meters should be maintained.

10.1.2 Provision should be made in the design of the road shoulders at important wetland crossings to avoid any oil accumulation or hazardous material spills from ending up in such wetlands. In addition, oil traps of adequate capacity should be constructed in such habitats.

10.1.3 Bridging rather than filling should be the preferred option in all cases where patches of natural vegetation are bisected or wetlands crossed.

10.2 Construction:

10.2.1 In the construction phase care should be taken to ensure that the area physically destroyed or damaged be kept to a minimum by fencing off the construction sites.

10.2.2 Storage of sand, cement, fuel, tarmac and other hazardous material should be at predetermined sites where the danger of it leaching into watercourses can be kept at a minimum.

10.2.3 The location of borrow-pits and quarries should be critically selected to cause minimum environmental damage.

10.2.4 An Environmental Site Officer should be appointed for the duration of the construction and rehabilitation phases of the project to ensure compliance with environmental prescriptions or recommendations.

- 10.2.5 Regular environmental training should be given to construction workers during the construction phase to ensure that individuals of the various taxa affected are properly translocated and not killed.

10.3 Rehabilitation:

- 10.3.1 The rehabilitation of the road verges should only be done with suitable indigenous plant species. A qualified horticulturist should advise on suitable species. Under no circumstances should invasive exotic species be used for this purpose.
- 10.3.2 Where alien invasive plant species occur in the road reserve area it should be removed.
- 10.3.3 No pesticides or herbicides should be used for controlling weeds or invertebrates in the road reserves. Burning of the road reserve in a mosaic pattern of uneven ages would provide the habitat diversity necessary to maintain the diversity of other taxa.

11.SUMMARY AND CONCLUSION

In general, the construction of new roads will result in loss of biodiversity at both a local and regional level due to the restriction of movement between plant and animal populations, increased mortality, habitat fragmentation, edge effect, invasion by exotic species and increased human contact to previously inaccessible areas (Findlay & Bourdages, 2000, Clark & Karr 1979, Forbes 1992). Birds, however, have the ability to move relatively easily between habitats, or, to disperse to new habitats. This movement is not only due to disturbance, but also due to territoriality, dominance, juvenile dispersal and short and long distance migration.

Most of the more than 225 species listed in this account have also adapted to some degree to human habitation, disturbance and landscape alteration. The Strandfontein Sewage Works serve as a case in point, where the sizable population of resident birds is due directly to the man made habitat that is enriched by anthropogenic effluent. These eutrophic systems are well known around the world, and closer at home, the extraordinary richness of bird life at the Paarl and Stellenbosch sewage works, serve as good examples. The majority of the species occurring in these habitats are also common species and are widely distributed.

Bird species with highly specialized habitat requirements, restricted habitats or those that could not survive in harmony with agricultural or urban development, such as the Flufftails and some raptors have long ago become very scarce in the Western Cape Province. The species remaining are generally well adapted to development and are mobile and should temporarily disperse during the road building process and recolonize their former habitats after completion of the construction works. The speed of re-introduction and the success of post construction habitat utilization will be a direct consequence of the environmental quality, logistics and sensitivity of the construction phase.

Globally, there is shift away from conservation management in formally conserved areas, to conservation in urban, peri-urban and rural landscapes. In addition to this new research focus, the function of roads in these man-altered landscapes are

becoming increasingly important for the purposes of conservation management. Recent examples in Southern Africa (Whitmore et al. 2002) show the application of current best practices in this dynamic field. If the conservation management of this development is approached with sensitivity to the dynamics of road edge management for conservation and biodiversity enhancement, this development, instead of becoming a public participation nightmare, will become a benchmark model in this country.

The positive outcomes of proper road edge management are complex and numerous (Pfisten & Keller 1995). A few such outcomes are listed below:

- corridors: Well managed road edges serve as corridors that will allow the movement of plants and animals into areas that were previously inaccessible to them (Martin and Pepler 2002, Andrews 1990, Beier & Loe 1992, Jarman 1986).

- refugia: The occurrence of species that are not tolerant of human disturbance, indicates that some of these areas may be well managed (perhaps by default) and the example of the Greywing Francolin coveys in Sector 1 serves as an example here (Blair & Tate 1972, Laursen 1981).

- plant and animal micro-reserves: There are numerous examples of road verges being the only extant habitat for rare and endangered species (Boucher 1981, Rebelo 1996, Whitmore et al. 2002). The example of some highly endangered *Gladiolus* species growing on road verges in the Paarl district (Goldblatt and Manning 1998) serves as an example here

- seed stores: Valuable seed stores are found on well managed road edges which serve as important feeding areas for many granivorous birds and can also be used to seed newly stabilized road edges.

- educational functions: The proposed road will bypass at least 32 schools when completed, and could serve as an easily available open air classroom and laboratory (Stuart & Stuart 1994). It will make sense to use these public assets wisely, especially for communities and schools that are less affluent and with restricted access to transport.

From a bird perspective and provided that the mitigation measures proposed are implemented there should be negligible negative impact likely to affect the decision to proceed with the project. Special attention to the management of public concerns will however be needed in respect of Sector 1: Southern Greenfields Section. Not only does this section support the most diverse bird fauna but also some charismatic species to which the general public relates more readily. The road could also compromise the integrity of the entire wetland system in this area as well as the connection with the False Bay Coast and one should expect some opposition in this regard rather than specific issues regarding the birds in the area.

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13 Appendix 1: Rondevlei Reserve Bird List

Birds that may be susceptible to construction disturbance marked in yellow, with annotations for the Strandfontein Sewage Works (SSW).

Rondevlei Bird List: <http://www.rondevlei.co.za/frames.htm> (accessed 19/3/02)

1. ***Podiceps cristatus***

Great Crested Grebe

Common resident

2. ***Podiceps nigricollis***

Black-necked Grebe

Irregular non-breeding visitor (not at SSW, site of national importance)

3. ***Tachybaptus ruficoilis***

Dabchick

Common resident

4. ***Pachyptila desolata***

Antarctic Prion

Vagrant: Single record during 1957

5. ***Oceanites oceanicus***

Wilson's Storm Petrel

Vagrant: Dead bird in 1952

6. ***Pelecanus onocrotalus***

White Pelican

Regular non-breeding visitor

7. ***Pelecanus rufescens***

Pinkbacked Pelican

Not recorded since 1954

8. ***Morus capensis***

Cape Gannet

Vagrant: No records since 1967

9. ***Phalacrocorax carbo***

White-breasted Cormorant

Regular non-breeding visitor

10. ***Phalacrocorax capensis***

Cape Cormorant

Rare non-breeding visitor

11. ***Phalacrocorax africanus***

Reed Cormorant

Common resident

12. ***Anhinga melanogaster***

Darter

Common resident

13. ***Ardea cinerea***

Grey Heron

Common resident

14. ***Ardea melanocephala***

Black-headed Heron

Uncommon resident

15. ***Ardea purpurea***

Purple Heron

Uncommon resident

16. ***Egretta alba*** Great White Egret
Rare non-breeding visitor
17. ***Egretta garzetta*** Little Egret
Regular breeding visitor
18. ***Egretta intermedia*** Yellowbilled Egret
Regular non-breeding visitor
19. ***Egretta ardesiaca*** Black Egret
Vagrant: Last recorded in 1953
20. ***Bubulcus ibis*** Cattle Egret
Regular non-breeding visitor
21. ***Ardeola ralloides*** Squacco Heron
Single bird in 1985
22. ***Nycticorax nycticorax*** Black-crowned Night Heron
Uncommon resident
23. ***Ixobrychus minutus*** Little Bittern
Regular breeding visitor
24. ***Scopus umbretta*** Hamerkop

Rare non-breeding visitor

25. ***Ciconia nigra***

Black Stork

Rare non-breeding visitor

26. ***Ciconia ciconia***

White Stork

Rare migrant

27. ***Threskiornis aethiopicus***

Sacred Ibis

Common

28. ***Plegadis falcinellus***

Glossy Ibis

Irregular breeding visitor

29. ***Platalea alba***

African Spoonbill

Regular breeding visitor

30. ***Phoenicopterus ruber***

Greater Flamingo

Irregular non-breeding visitor

31. ***Phoenicopterus minor***

Lesser Flamingo

Rare non-breeding visitor

32. ***Plectropterus gambensis***

Spurwing Goose

Irregular breeding visitor

33. ***Alopochen aegyptiacus*** Egyptian Goose
Common resident
34. ***Tadorna cana*** Shelduck
Irregular non- breeding visitor
35. ***Anas clypeata*** European Shoveller
Rare migrant
36. ***Anas smithii*** Cape Shoveller
Common resident
37. ***Anas sparsa*** Black Duck
Rare non-breeding resident
38. ***Anas undulata*** Yellowbilled Duck
Common resident
39. ***Anas erythrorhyncha*** Redbilled Teal
Common resident
40. ***Anas capensis*** Cape Teal
Regular breeding visitor
41. ***Anas hottentota*** Hottentot Teal

Regular breeding visitor

42. ***Dendrocygna viduata*** White-faced Duck

Rare breeding visitor

43. ***Dendrocygna bicolor*** Fulvous Duck

Rare breeding visitor

44. ***Netta erythrophthalma*** Southern Pochard

Common resident

45. ***Oxyura maccoa*** Maccoa Duck

Regular non-breeding visitor (Has bred at SSW)

46. ***Thalassornis leuconotus*** White-backed Duck

Rare non-breeding visitor

47. ***Falco peregrinus*** Peregrine Falcon

Rare non-breeding visitor

48. ***Falco biarmicus*** Lanner Falcon

Rare non-breeding visitor

49. ***Falco tinnunculus*** Rock Kestrel

Rare non-breeding visitor

50. ***Falco rupicoloides*** Greater Kestrel
Rare non-breeding visitor
51. ***Falco naumanni*** Lesser Kestrel
Vagrant: Last recorded in 1952
52. ***Milvus migrans parasitus*** Yellowbilled Kite
Vagrant: Last recorded in 1963
53. ***Elanus caeruleus*** Black-shouldered Kite
Uncommon resident
54. ***Aquila verreauxii*** Black Eagle
Vagrant: One sighting in 1967
55. ***Accipiter rufiventris*** Redbreasted Sparrow-hawk
Rare non-breeding visitor
56. ***Haliaeetus vocifer*** African Fish Eagle
Irregular non-breeding visitor (but breeds at adjacent Zeekoevlei)
57. ***Hierraetus pennatus*** Booted Eagle
Rare non-breeding visitor
58. ***Buteo buteo vulpinus*** Steppe Buzzard

Non-breeding visitor

59. ***Buteo rufofuscus***

Jackal Buzzard

Rare non-breeding visitor

60. ***Melierax canorus***

Pale Chanting Goshawk

Vagrant: Last recorded in 1969

61. ***Circus ranivorus***

African Marsh Harrier

Rare resident

62. ***Polyboroides typus***

Gymnogene

Vagrant: Single recorded in 1974

63. ***Pandion haliaetus***

Osprey

Vagrant; Single record in 1987

64. ***Fracolinus africanus***

Greywing Francolin

Rare non-breeding visitor

65. ***Coturnix coturnix***

Common Quail

Rare non-breeding visitor

66. ***Fracolinus capensis***

Cape Francolin

Common resident

67. ***Coturnix delegorguei*** Harlequin Quail
Vagrant: No records since 1952
68. ***Numida meleagris*** Helmeted Guineafowl
Common resident
69. ***Rallus caerulescens*** African Rail
Rare non-breeding visitor
70. ***Amaurornis flavirostris*** Black Crake
Uncommon resident
71. ***Porzana pusilla*** Baillon's Crake
Vagrant: Single record in 1979
72. ***Sarothrura rufa*** Redchested Flufftail
No records since 1953
73. ***Porphrio porphrio*** Purple Gallinule
Common resident
74. ***Porphrula alleni*** Lesser Gallinule
Vagrant: Last recorded in 1979
75. ***Gallinula chloropus*** Moorhen

Common resident

76. ***Fulica cristata*** Red-knobbed Coot

Common resident

77. ***Actophilornis africanus*** African Jacana

Rare non-breeding visitor

78. ***Rostratula benghalensis*** Painted Snipe

Rare non-breeding visitor

79. ***Arenaria interpres*** Turnstone

Migrant, but regular at SSW

80. ***Charadrius hiaticula*** Ringed Plover

Common resident

81. ***Charadrius marginatus*** White-fronted Plover

Rare visitor: No records since 1974, but occurs at SSW

82. ***Charadrius pallidus*** Chestnut-banded Plover

Rare migrant: No records since 1967

83. ***Charadrius pecuarius*** Kittlitz's Plover

Breeding visitor

84. ***Charadrius tricollaris*** Three-banded Plover

Regular breeding visitor

85. ***Charadrius leschenaultii*** Sand Plover

Rare migrant: Last recorded in 1982

86. ***Pluvialis squatarola*** Grey Plover

Regular visitor, but regular at SSW

87. ***Vanellus coronatus*** Crowned Plover

Irregular non-breeding visitor

88. ***Vanellus armatus*** Blacksmith Plover

Common resident

89. ***Gallinago nigripennis*** Ethiopian Snipe

Regular non-breeding visitor

90. ***Calidris alpina*** Dunlin

Rare migrant: No records since 1972

91. ***Calidris ferruginua*** Curlew Sandpiper

Common non-breeding migrant

92. ***Calidris minuta*** Little Stint

Common non-breeding migrant

93. ***Calidris canutus*** Knot

Rare migrant: No records since 1972 (not at SSW)

94. ***Calidris melanotos*** Pectoral Sandpiper

Rare migrant: Single record in 1965, but recorded at SSW

95. ***Calidris alba*** Sanderling

Rare migrant: Single record in 1960

96. ***Philomachus pugnax*** Ruff

Common non-breeding migrant

97. ***Xenus cinereus*** Terek Sandpiper

Rare migrant: Last recorded in 1960

98. ***Tringa hypoleucos*** Common Sandpiper

Rare migrant: Last recorded in 1974 (regular at SSW)

99. ***Tringa tetanus*** Redshank

Rare migrant: No records since 1954

100. ***Tringa stagnatilis*** Marsh Sandpiper

Common non-breeding migrant

101. ***Tringa nebularia*** Greenshank
Uncommon non-breeding migrant
102. ***Tringa glareola*** Wood Sandpiper
Common
103. ***Limosa lapponica*** Bar-tailed Godwit
Rare migrant: Last recorded in 1952, but regular at SSW
104. ***Numenius arquata*** Curlew
Rare migrant
105. ***Munenus phaeopus*** Whimbrel
Rare migrant: Last recorded in 1961
106. ***Recurvirostra avosetta*** Avocet
Regular non-breeding visitor
107. ***Himantopus himantopus*** Black-winged Stilt
Regular breeding visitor
108. ***Phalaropus lobatus*** Red-necked Phalarope
Rare migrant: No recorded since 1974
109. ***Burhinus capensis*** Spotted Dikkop

Common resident

110. ***Burhimus vermiculatus*** Water Dikkop

Rare visitor: Single bird in 1987

111. ***Catharacta antartica*** Sub-antarctic Skua

Vagrant: Single record in 1969

112. ***Larus cirrocephalus*** Grey-headed Gull

Irregular non-breeding visitor

113. ***Larus dominicanus*** Kelp Gull

Common resident

114. ***Larus hartlaubi*** Hartlaub's Gull

Common resident

115. ***Hydroprogne caspia*** Caspian Tern

Regular non-breeding visitor

116. ***Sterna hirundo*** Common Tern

Irregular non-breeding visitor

117. ***Sterna paradisaea*** Arctic Tern

Vagrant

118. ***Sterna sandvicensis*** Sandwich Tern
Rare migrant
119. ***Sterna bergii*** Swift Tern
Regular non-breeding visitor
120. ***Sterna balaenarum*** Damara Tern
Vagrant: Single record in 1979
121. ***Anos sp.*** Noddy
Vagrant: Single record in 1979
122. ***Chlidonias leucopterus*** White-winged Tern
Irregular migrant
123. ***Chlidonias hybridus*** Whiskered Tern
Irregular non-breeding visitor, of global importance
124. ***Columba guinea*** Rock Pigeon
Regular non-breeding visitor
125. ***Columba arquatrix*** Rameron Pigeon
Rare non-breeding visitor
126. ***Streptopelia semitorquata*** Red-eyed Dove

Common resident

127. ***Streptopelia capicola*** Cape Turtle Dove

Common resident

128. ***Streptopelia senegalensis*** Laughing Dove

Common resident

129. ***Oena capensis*** Namaqua Dove

Rare non-breeding visitor

130. ***Aplopelia larvata*** Cinnamon Dove

Vagrant: Last recorded in 1967

131. ***Cuculus solitarius*** Redchested Cuckoo

Rare : No records since 1970

132. ***Chrysococcyx klaas*** Klaas's Cuckoo

Rare non-breeding visitor

133. ***Chrysococcyx caprius*** Diederik Cuckoo

Rare non-breeding visitor

134. ***Centropus superciliosus*** Burchell's Coucal

Uncommon resident

135. ***Tyto alba*** Barn Owl
Regular non-breeding visitor
136. ***Tyto capensis*** Grass Owl
Vagrant: No records since 1969
137. ***Asio capensis*** Marsh Owl
Rare resident
138. ***Bubo africanus*** Spotted Eagle Owl
Rare resident
139. ***Caprimulgus pectoralis*** Fiery-necked Nightjar
Rare resident
140. ***Apus barbatus*** Black Swift
Irregular non-breeding visitor
141. ***Apus caffer*** White-rumped Swift
Irregular non-breeding visitor
142. ***Apus affinus*** Little Swift
Irregular non-breeding visitor
143. ***Apus melba*** Alpine Swift

Irregular non-breeding visitor

144. ***Colius striatus***

Speckled Mousebird

Common resident

145. ***Colius colius***

White-backed Mousebird

Uncommon resident

146. ***Colius indicus***

Redfaced Mousebird

Rare breeding visitor

147. ***Ceryle rudis***

Pied Kingfisher

Uncommon visitor

148. ***Ceryle maxima***

Giant Kingfisher

Rare non-breeding visitor

149. ***Alceo semitorquata***

Half-collared Kingfisher

Rare: No records since 1952

150. ***Alcedo cristata***

Malachite Kingfisher

Uncommon resident

151. ***Halcyon albiventris***

Brown-hooded Kingfisher

Rare non-breeding visitor

152. ***Merops persicus*** Blue-cheeked Bee-eater
Rare migrant
153. ***Upupa africana*** African Hoopoe
Irregular non-breeding visitor
154. ***Lybius leucomelas*** African Pied Barbet
Uncommon resident
155. ***Hirundo rustica*** European Swallow
Common migrant
156. ***Hirundo albigularis*** White-throated Swallow
Common breeding migrant
- 156.1 ***Hirundo dimidiata*** Pearlbreasted Swallow
Regular at SSW
157. ***Hirundo cucullata*** Greater Striped Swallow
Common migrant
158. ***Hirundo fuligula*** Rock Martin
Rare non-breeding visitor
159. ***Delichon urbica*** House Martin

Rare: Last recorded in 1969

159.1 *Riparia riparia* Sand Martin

Regular at SSW

160. ***Riparia paludicola*** Brown-throated Martin

Common resident

161. ***Riparia cincta*** Banded Martin

Rare migrant: Last recorded in 1968

162. ***Psalidoprocne holomelas*** Black Saw-wing Swallow

Rare migrant

163. ***Corvus albus*** Pied Crow

Regular non-breeding visitor

164. ***Corvus capensis*** Black Crow

Vagrant: No records since 1971

165. ***Corvus albicollis*** Whitenecked Raven

Vagrant: No records since 1970

166. ***Pyvnonotus capensis*** Cape Bulbul

Common resident

167. ***Turdus olivaceus*** Olive Thrush
Uncommon resident
168. ***Saxicola torquata*** Stone Chat
Rare non-breeding visitor
169. ***Cossypha caffra*** Cape Robin
Common resident
170. ***Erythopygia coryphaeus*** Karoo Robin
Common resident
171. ***Phylloscopus trochilus*** Willow Warbler
Rare migrant
172. ***Acrocephalus gracilirostris*** Cape Reed Warbler
Common resident
173. ***Acrocephalus baeticatus*** African Marsh Warbler
Regular breeding visitor
174. ***Bradypterus baboecula*** African Sedge Warbler
Common resident
175. ***Sphenoeacus afer*** Grass Bird

Uncommon resident

176. ***Sylvietta rufescens*** Long-billed Crombec

Uncommon resident

177. ***Apalis thoracica*** Bat-throated Apalis

Uncommon resident

178. ***Cisticola juncidis*** Fantailed Cisticola

Rare non-breeding visitor, common at SSW

179. ***Cisticola textrix*** Cloud Cisticola

Rare: Last recorded in 1955

180. ***Cisticola fulvicapilla*** Neddicky

Rare: Last recorded in 1973

181. ***Cisticola subrufcapilla*** Grey-backed Cisticola

Uncommon resident

182. ***Cisticola tinniens*** Le Vaillant's Cisticola

Common resident

183. ***Prinia maculosa*** Karoo Prinia

Common resident

184. ***Muscicapa striata*** Spotted Flycatcher

Rare migrant

185. ***Muscicapa adusta*** Dusky Flycatcher

Irregular non-breeding visitor

186. ***Parisoma subcaeruleum*** Titbabbler

Rare: No records since 1968

187. ***Sigelus silens*** Fiscal Flycatcher

Rare non-breeding visitor

188. ***Batis capensis*** Cape Batis

Rare non-breeding visitor

189. ***Stenostira scita*** Fairy Flycatcher

Vagrant: Single record during 1978

190. ***Terpsiphone viridis*** Paradise Flycatcher

Irregular breeding visitor

191. ***Motacilla aquimp*** Pied Wagtail

Vagrant: Last recorded 1969

192. ***Motacilla capensis*** Cape Wagtail

Common resident

193. ***Anthus novaeseelandiae*** Richard's Pipit

Rare visitor

194. ***Macronyx capensis*** Orange-throated Longclaw

Uncommon resident, regular at SSW

195. ***Lanius collaris*** Fiscal Shrike

Common resident

196. ***Laniarius ferrugineus*** Southern Boubou

Rare resident

197. ***Telophorus zeylonus*** Bokmakierie

Uncommon resident

198. ***Sturnus vulgaris*** European Starling

Common resident

199. ***Creatophora cinerea*** Wattled Starling

Vagrant

200. ***Onychognathus morio*** Red-winged Starling

Regular non-breeding visitor

201. ***Spreo bicolor*** Pied Starling
Rare: No records since 1973
202. ***Promerops cafer*** Cape Sugarbird
Vagrant: Single record in 1959
203. ***Nectarinia famosa*** Malachite Sunbird
Irregular non-breeding visitor
204. ***Nectarinia violacea*** Orange-breasted Sunbird
Irregular non-breeding visitor
205. ***Nectarinia chalybea*** Lesser Double-collared Sunbird
Common resident
206. ***Nectarinia fuscus*** Dusky Sunbird
Vagrant: Only recorded in 1978
207. ***Zosterops pallidus*** Cape White-eye
Common resident
208. ***Passer domesticus*** House Sparrow
Irregular non-breeding visitor
209. ***Passer melanurus*** Cape Sparrow

Common resident

210. ***Ploceus capensis*** Cape Weaver

Common resident

211. ***Ploceus velatus*** Southern Masked Weaver

Common resident

212. ***Euplectes orix*** Red Bishop

Irregular breeding visitor

213. ***Euplectes capensis*** Cape Bishop

Uncommon resident

214. ***Estrilda melanotis*** Sweet Waxbill

Vagrant: Last recorded in 1967

215. ***Estrilda astrild*** Common Waxbill

Common resident

216. ***Vidua macroura*** Pin-tailed Whydah

Regular breeding visitor

217. ***Serinus canicollis*** Cape Canary

Common resident

218. ***Serinus sulphuratus*** Yellow Canary

Uncommon/rare

220. ***Serinus albogularis*** White-throated Canary

Rare breeding visitor

221. ***Emberiza capensis*** Cape Bunting

Rare non-breeding visitor

Most recent additions:

222. ***Anas platyrhynchos*** Mallard Duck

Invasive species

223. ***Corvus splendens*** Indian House Crow

Invasive species

224. ***Accipiter tachiro*** African Goshawk

Common resident

225. ***Accipiter melanoleucus*** Black Sparrowhawk

Common resident

226. ***Dendropicos fuscenscens*** Cardinal Woodpecker

Rare visitor

Rondevlei Bird List: <http://www.rondevlei.co.za/frames.htm> (accessed 19/3/02)

Appendix 2: ADU Bird Atlas Data for Strandfontein

AVIAN DEMOGRAPHY UNIT

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SOUTHERN AFRICAN BIRD ATLAS PROJECT

This is a summary report for squares. The number of checklists taken monthly is given, as well as the number of species present and breeding. A list of recorded species is given followed by a string of characters:

1. A string of 12 numbers (one for each month). These numbers are "percentages" of the number of times the bird was recorded against the number of checklists taken in that month, i.e. reporting rates. A star denotes that no checklists have been taken.
2. The 13th column gives the percentage of total sightings against total checklists taken, i.e. the reporting rate.
3. In column 14 is N, the number of checklists taken.

For breeding records the figures have a different significance. The monthly "percentage" given here is of the number of times the species was recorded breeding in the month against the total number of breeding records, thus reflecting in which months it breeds more often. The total number of breeding records is given in the last column.

Notation used:

- * a percentage of 1 denotes a reporting rate of 5%-14.9%
- * a percentage of 2 denotes a reporting rate of 15%-24.9%, and so on.
- * R denotes 'rare' for a reporting rate of 1%-4.9%
- * V denotes 'vagrant' for a reporting rate of <1%
- * X denotes unseasonal breeding (<5%).

Red Data Status:

C Critical
E Endangered
NT Near-threatened
V Vulnerable
RE Regionally Extinct

Reference: K.N. Barnes (Ed). 2000. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Johannesburg: BirdLife South Africa

(c) Avian Demography Unit, UCT

Square: 3418BA MITCHELLS PLAIN

Number of cards per month :

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
54	55	61	61	54	53	63	54	59	61	55	54	684

Number of species present :

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
186	182	175	178	156	160	170	177	180	186	185	177	254

Number of species breeding :

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
43	33	29	21	15	15	30	44	58	59	67	54	94

All Records

Breeding Records

JFMAMJ JASOND % N JFMAMJ JASOND N

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JACKASS PENGUIN V 003 111R11 11R111 8 53 ***** 0
GRT CRESTED GREBE 006 676543 334565 47 323 13**1* **1*31 8
BLACK-NECKED GREBE 007 566665 665565 56 384 *3***** 7 3
DABCHICK 008 777777 777787 71 484 311*** *XX112 41
SHY ALBATROSS V 011 R***** 0 1 ***** 0
BLKBROWD ALBATROSS NT 012 *****R *R***** 0 2 ***** 0
YELLWSE ALBATROSS NT 014 ***** *R*R** 0 2 ***** 0
STHRN GIANT PETREL NT 017 **R*** RRRR* 1 7 ***** 0
NTHRN GIANT PETREL NT 018 ***** R***** 0 1 ***** 0
ANTARCTIC FULMAR 019 ***** **RR** 0 3 ***** 0
PINTADO PETREL 021 ***** *RRR** 1 5 ***** 0
GREATWINGED PETREL 023 R***** 0 1 ***** 0
SOFTPLUMAGD PETREL 024 ***** *RRR** 1 4 ***** 0
BLUE PETREL 028 ***** *RR*** 0 3 ***** 0
BROADBILLED PRION 029 R****R RRRR** 1 7 ***** 0
SLENDERBILLD PRION 030 *****R RRR*R* 1 8 ***** 0
WHITECHINND PETREL NT 032 1RRR*R 1111R 4 29 ***** 0
CORY'S SHEARWATER 034 RR**** ***** 0 2 ***** 0
GREAT SHEARWATER 035 R***** ***** 0 1 ***** 0
SOOTY SHEARWATER 037 R1111 R1R1R1 7 46 ***** 0
LITTLE SHEARWATER 039 ***R** *****R* 0 2 ***** 0
EURPN STORM PETREL 042 R***** *****R 0 2 ***** 0
WILSN STORM PETREL 044 *RR*R ***** 0 3 ***** 0
WHITE PELICAN NT 049 776777 766687 69 473 ***** 0
CAPE GANNET V 053 112111 211211 13 92 ***** 0
WHITBRST CORMORANT 055 788787 767888 74 507 11X*11 11111 56
CAPE CORMORANT NT 056 888888 776779 75 511 21**** *11*42 14
BANK CORMORANT V 057 RRRR* RR*R1R 3 20 ***** 0
REED CORMORANT 058 687787 788778 73 498 2****4 2**2** 5
CROWNED CORMORANT NT 059 RR1RR 111R** 4 25 ***** 0
DARTER 060 677777 666566 64 435 12X**1 *12121 32
GREY HERON 062 787878 787888 75 516 *****5 **5*** 2
BLACKHEADED HERON 063 677766 666667 63 434 ***** 0
PURPLE HERON 065 655664 456675 55 375 ***** 0
GREAT WHITE EGRET 066 111121 RRR111 9 59 ***** 0

```

LITTLE EGRET 067 776666 554568 58 397 ***** 0
 YELLOWBILLED EGRET 068 665553 322345 41 283 ***** 0
 CATTLE EGRET 071 788888 888889 80 545 *****9 1
 SQUACCO HERON 072 ***R*R **R*** 0 3 ***** 0
 BLKCRN NIGHT HERON 076 654232 123565 37 251 **9*** 1
 LITTLE BITTERN 078 **RR** *1R*RR 1 10 ***9** 1
 HAMERKOP 081 211111 R11111 11 72 ***** 0
 WHITE STORK 083 R***** **R**R 1 5 ***** 0
 BLACK STORK NT 084 ***R*R *R***** 1 5 ***** 0
 SACRED IBIS 091 776677 777788 71 488 ***** **73** 3
 GLOSSY IBIS 093 675554 211236 40 272 ***** 0
 HADEDA IBIS 094 R***** **RR** 1 4 ***** 0
 AFRICAN SPOONBILL 095 433222 333344 31 212 ***** 0
 GREATER FLAMINGO NT 096 776666 665676 62 422 *****9 1
 LESSER FLAMINGO NT 097 332322 121113 20 138 *****9 1
 MUTE SWAN 098 *****1 ***** 0 3 ***** 0
 WHITEFACED DUCK 099 1RRRR* *****R 1 9 ***** 0
 FULVOUS DUCK 100 R*R*** ***** 0 3 ***** 0
 WHITEBACKED DUCK 101 *R***** ***** 0 1 ***** 0
 EGYPTIAN GOOSE 102 887787 888878 77 524 1X**** X12222 69
 S AFRICAN SHELDUCK 103 242221 111233 20 136 ***** 0
 YELLOWBILLED DUCK 104 787787 888888 76 522 XX*XXX X12121 48
 AFRICAN BLACK DUCK 105 R*RRR1 R1R*RR 3 20 ***** 0
 CAPE TEAL 106 677766 766677 65 446 11111X X11121 112
 HOTTENTOT TEAL 107 R11R12 11*111 8 53 *****9 ***** 1
 REDBILLED TEAL 108 655566 776666 58 395 ***** *3*333 8
 CAPE SHOVELLER 112 777777 887777 71 486 XXXX** 112221 75
 SOUTHERN POCHARD 113 665555 665676 57 392 X21X** *X1112 26
 SPURWINGED GOOSE 116 444445 555545 46 315 31***** **1*14 8
 MACCOA DUCK 117 565555 554566 52 355 2121** *1*122 13
 BLACKSHOULDRD KITE 127 788898 876778 75 514 **3*** **7*** 3
 BOOTED EAGLE 136 R*R*** *****R 1 4 ***** 0
 BLKBRS SNAKE EAGLE 143 R***** ***** 0 1 ***** 0
 AFRICAN FISH EAGLE 148 111322 223121 18 122 ***** 0
 STEPPE BUZZARD 149 663RR* ***146 21 142 *****
 JACKAL BUZZARD 152 RR*R** R**RRR 2 11 ***** 0
 REDBRS SPARROWHAWK 155 *R*RR* R**R** 1 7 ***** 0
 AFRICAN GOSHAWK 160 ***** *RR*** 0 2 ***** 0
 AFR MARSH HARRIER V 165 454665 543234 43 293 ***** 0
 BLACK HARRIER NT 168 R***** ***** 0 1 ***** 0
 OSPREY 170 R***** ***** 0 1 ***** 0
 PEREGRINE FALCON NT 171 ***R** *R***R 0 3 ***** 0
 LANNER FALCON NT 172 R*R1RR RR**RR 2 15 ***** 0
 ROCK KESTREL 181 111111 111111 11 77 ***** 0
 GREYWING FRANCOLIN 190 111R11 111112 9 63 ***** **7*3* 3
 CAPE FRANCOLIN 195 465667 788775 63 429 1***** **1242 14
 COMMON QUAIL 200 RRR*** R**R*R 1 6 ***** 0
 HELMETD GUINEAFOWL 203 444344 566645 44 301 21X*** **1212 21
 AFRICAN RAIL 210 RRR111 111111 6 41 ***** 0
 BLACK CRAKE 213 122112 212112 15 102 ***** 0
 REDCHSTD FLUFFTAIL 217 ***** **R* 0 1 ***** 0
 PURPLE GALLINULE 223 455666 644455 49 334 *121** *12122 12

AMR PRPL GALLINULE 225 ***** R***** 0 1 ***** ***** 0
 MOORHEN 226 888887 887898 78 535 X1XXX* XX2222 60
 REDKNOBBED COOT 228 898898 888998 83 567 111XXX 111111 186
 AFRICAN JACANA 240 ***** **R1* 1 5 ***** ***** 0
 PAINTED SNIPE NT 242 **R*1* RRRRRR 2 14 ***** **5*5* 2
 A BK OYSTERCATCHER NT 244 787776 666777 65 448 322*** ****22 51
 RINGED PLOVER 245 56541* **R255 28 189 ***** ***** 0
 WHITEFRONTD PLOVER 246 343422 223234 29 196 111XX* X22XXX 23
 CHESTNUTBND PLOVER NT 247 R***** ****R* 0 2 ***** ***** 0
 KITTLITZ'S PLOVER 248 454553 455566 48 326 11XXX* 111111 87
 THREEBANDED PLOVER 249 545665 545456 49 333 1XXX*X X11112 44
 GREY PLOVER 254 21R*** **1R13 7 45 ***** *****9 1
 CROWNED PLOVER 255 222233 444344 31 212 1XX*** X2X132 22
 BLACKSMITH PLOVER 258 898888 998899 85 579 XXXXXX 122221 85
 TURNSTONE 262 11**** **1322 9 60 ***** ***** 0
 COMMON SANDPIPER 264 4421R* R22444 21 147 ***** ***** 0
 WOOD SANDPIPER 266 3342** RR1224 18 124 ***** ***** 0
 MARSH SANDPIPER 269 4221RR *R1124 14 94 ***** ***** 0
 GREENSHANK 270 55411R 123577 33 226 ***** ***** 0
 KNOT 271 1**R** **R1R 1 9 ***** ***** 0
 CURLEW SANDPIPER 272 674422 223677 42 288 ***** ***** 0
 LITTLE STINT 274 57663R R11466 39 264 ***** ***** 0
 SANDERLING 281 1111R* R*1111 6 43 ***** ***** 0
 RUFF 284 4653R* *R2346 27 185 ***** ***** 0
 ETHIOPIAN SNIPE 286 112211 11R122 13 89 ***** 9***** 1
 BLACKTAILED GODWIT 287 *R**** ***** 0 1 ***** ***** 0
 BARTAILED GODWIT 288 RRR**R R**212 5 32 ***** ***** 0
 CURLEW 289 R**R** ***** 0 3 ***** ***** 0
 WHIMBREL 290 1R*R** ***111 3 20 ***** ***** 0
 GREY PHALAROPE 291 RR*R** ***** 1 4 ***** ***** 0
 REDNECKD PHALAROPE 292 R1RR** *****1 2 11 ***** ***** 0
 AVOCET 294 676644 434677 55 376 ***** **55** 2
 BLACKWINGED STILT 295 787878 878889 77 525 ***X** X12331 45
 SPOTTED DIKKOP 297 442412 334554 34 234 111*** *X1231 55
 WATER DIKKOP 298 1111RR R11112 9 63 2*1*** **1323 12
 ARCTIC SKUA 307 RRRR** ***** 1 6 ***** ***** 0
 SUBANTARCTIC SKUA 310 ***** *R*RR* 0 3 ***** ***** 0
 KELP GULL 312 899999 898999 87 594 1X**** **X333 54
 GREYHEADED GULL 315 111221 211131 13 91 ***** ***** 0
 HARTLAUB'S GULL 316 898998 998999 86 586 *X211X X121** 21
 SABINE'S GULL 318 *RRR** ***** 0 3 ***** ***** 0
 CASPIAN TERN NT 322 222321 222222 20 140 ***** ***** 0
 SWIFT TERN 324 566553 424455 45 310 *12331 2***** 12
 SANDWICH TERN 326 67532R 112355 33 224 ***** ***** 0
 COMMON TERN 327 775521 111356 35 238 ***** ***** 0
 ARCTIC TERN 328 1R1RR* RRRR11 5 33 ***** ***** 0
 ANTARCTIC TERN 329 ***** RR*RR* 1 5 ***** ***** 0
 ROSEATE TERN E 330 *R**** ***** 0 1 ***** ***** 0
 LITTLE TERN 335 *RR*** ***** 0 3 ***** ***** 0
 WHISKERED TERN 338 1RRR*R ***111 3 23 2***** ****34 9
 WHITEWINGED TERN 339 677732 122455 41 283 ***** ***** 0
 NAMAQUA SANDGROUSE 344 ***** R***** 0 1 ***** ***** 0

FERAL PIGEON 348 443443 443345 38 258 ***** 0
 ROCK PIGEON 349 355444 444555 44 303 ***** **333* 3
 RAMERON PIGEON 350 ***R** R*RRRR 1 10 ***** 0
 REDEYED DOVE 352 454555 555665 51 350 *3*****8* 4
 CAPE TURTLE DOVE 354 887888 888899 82 559 ***** **91 7
 LAUGHING DOVE 355 787888 887887 76 522 ***** **262 5
 NAMAQUA DOVE 356 111RRR **R112 6 40 ***** 0
 REDCHESTED CUCKOO 377 ***** **R*R1 1 7 ***** 0
 JACOBIN CUCKOO 382 R***** 0 1 ***** 0
 KLAAS'S CUCKOO 385 *R**1R 11211* 6 40 ***** 0
 DIEDERIK CUCKOO 386 1RR*** **RR211 6 38 5*5*** ***** 2
 BURCHELL'S COUCAL 391 122123 233343 23 160 ***** 0
 BARN OWL 392 R***** **RR** 0 3 ***** 0
 MARSH OWL 395 ***** **R*** 0 2 ***** 0
 SPOTTED EAGLE OWL 401 11RR11 11111R 8 52 1***** **144* 8
 FIERYNCK NIGHTJAR 405 R*RRRR 111R1* 4 25 ***** 0
 BLACK SWIFT 412 454432 343455 37 256 ***** 0
 WHITERUMPED SWIFT 415 433111 1R3343 21 146 ***5** *****5* 2
 LITTLE SWIFT 417 343222 322334 27 185 ***** 0
 ALPINE SWIFT 418 21111* 112334 17 114 ***** 0
 SPECKLED MOUSEBIRD 424 232333 212332 24 163 ***** 0
 WHITEBKD MOUSEBIRD 425 111111 111111 7 50 ***** 0
 REDFACED MOUSEBIRD 426 1RRRRR **1R1R 3 20 ***** 0
 PIED KINGFISHER 428 332433 222333 28 191 ***** 0
 GIANT KINGFISHER 429 **RR11 RR1R1R 5 31 ***** 0
 MLCHITE KINGFISHER 431 R11211 111111 8 57 ***** **55* 2
 BRWNHD KINGFISHER 435 **R*** ***** 0 1 ***** 0
 BLUECHKD BEE-EATER 440 R***** ***** 0 2 ***** 0
 HOOPOE 451 11R12 222212 14 95 5***** *****5 4
 PIED BARBET 465 312122 212332 21 142 ***** 0 GROUND
 WOODPECKER 480 *R**** R***** 0 2 ***** 0
 CARDINL WOODPECKER 486 ***** **R** 0 1 ***** 0
 CLAPPER LARK 495 R***** **R* 0 3 ***** 0
 LONGBILLED LARK 500 *R**** ***** 0 1 ***** 0
 REDCAPPED LARK 507 11RRR1 222232 13 92 2***** **133 9
 THICKBILLED LARK 512 R***** ****1* 1 4 ***** 0
 EUROPEAN SWALLOW 518 788511 111158 39 268 ***** 0
 WHITETHRTD SWALLOW 520 7652*R R46777 43 296 1X**** **1232 38
 PEARLBRSTD SWALLOW 523 RRR**R **R*R* 1 9 ***** 0
 GRTR STRPD SWALLOW 526 33211R 113344 21 142 3***** **53* 4
 ROCK MARTIN 529 222133 443323 25 173 ***** 0
 HOUSE MARTIN 530 *RR**R ***R** 1 4 ***** 0
 SAND MARTIN 532 ***R** ***** 0 1 ***** 0
 BROWNTHRTEED MARTIN 533 676767 667776 67 456 ***1** 122212 17
 BANDED MARTIN 534 RR*R** **RRRR 2 11 ***** 0
 BLK SAWWNG SWALLOW 536 *RRR*R R*R*RR 2 13 ***** 0
 BLACK CROW 547 ***** **R*** 0 1 ***** 0
 PIED CROW 548 324455 556665 46 318 ***** *3**7* 3
 WHITENECKED RAVEN 550 R*RR*R R1RR1* 3 18 ***** 0
 SOUTHERN GREY TIT 551 ***** **R*R* 0 2 ***** 0
 CAPE BULBUL 566 888988 978899 82 564 ***** **1433 11
 SOMBRE BULBUL 572 ***R** *R*R** 0 3 ***** 0

OLIVE THRUSH 577 RR11RR 1R11RR 5 35 ***** 0
 CAPE ROCK THRUSH 581 RR**** *R**** 0 3 ***** 0
 CAPPED WHEATEAR 587 ***** R1RRRR 2 13 ***** 37 3
 FAMILIAR CHAT 589 ***R** RR**R* 1 6 ***** 0
 STONECHAT 596 121122 221221 15 100 ***** 55**** 4
 CAPE ROBIN 601 556767 777764 63 428 ***** 144*1* 12
 KAROO ROBIN 614 554554 655555 49 338 ***** 12342* 20
 TITBABBLER 621 ***R*R RR*R** 1 10 ***** 0
 FR MARSH WARBLER 631 1R1R** *11111 5 36 ***** 0
 CAPE REED WARBLER 635 666655 555676 56 384 X***** *X1333 24 AFR
 SEDGE WARBLER 638 464545 454655 47 322 ***** *9**** 1
 WILLOW WARBLER 643 *RR*** ***** 0 2 ***** 0
 BARTHROATED APALIS 645 *RRR11 12111R 8 55 ***** **73** 3
 LONGBILLED CROMBEC 651 *R*R11 11RRRR 4 26 ***** 0
 GRASSBIRD 661 111222 232221 16 109 ***** 333*** 3
 FANTAILD CISTICOLA 664 322333 332223 26 175 1***** *41111 8
 CLOUD CISTICOLA 666 *R*RR* *R*RR* 1 8 ***** 0
 GREYBCKD CISTICOLA 669 111222 222322 19 128 ***** 335*** 4
 LEVAILNT CISTICOLA 677 778888 777888 75 515 1XXXX* 112222 71
 NEDDICKY 681 **R*** RR***1 1 7 ***** 0
 SPOTTED PRINIA 686 877777 877888 74 509 X***** 112222 53
 SPOTTED FLYCATCHER 689 *R**** ***** 0 1 ***** 0
 DUSKY FLYCATCHER 690 ****R* **R**R 0 3 ***** 0
 FISCAL FLYCATCHER 698 111R11 111211 9 62 ***** **9** 1
 CAPE BATIS 700 ***** ****R* 0 1 ***** 0
 PARADSE FLYCATCHER 710 *R**** ***** 0 1 ***** 0
 AFR PIED WAGTAIL 711 ***** **R** 0 1 ***** 0
 CAPE WAGTAIL 713 898999 998999 87 593 XXXXXX 112211 75
 YELLOW WAGTAIL 714 ****RR *****R 0 3 ***** 0
 RICHARD'S PIPIT 716 543344 454455 42 285 1X**** **X133 21
 LONGBILLED PIPIT 717 ***R*R *R***R 1 4 ***** 0
 PLAINBACKED PIPIT 718 RR**** RR*RRR 1 8 ***** ****9* 1
 ORNGTHRTD LONGCLAW 727 466665 555555 52 359 XXX1X* 112221 30
 FISCAL SHRIKE 732 778888 888778 76 523 ***** **46* 5
 SOUTHERN BOUBOU 736 212223 332323 23 160 ***** 0
 BOKMAKIERIE 746 433445 445444 39 269 ***** *5*5** 2
 EUROPEAN STARLING 757 889998 998999 85 578 **1*** **441 8
 PIED STARLING 759 211223 244432 25 173 ***** ****9* 1
 WATTLED STARLING 760 *****R *****R 0 2 ***** 0
 REDWINGED STARLING 769 222122 212333 20 139 ***** 0
 CAPE SUGARBIRD 773 ***** R**RR* 1 5 ***** 0
 MALACHITE SUNBIRD 775 *11*11 1R1RRR 4 29 ***** 0
 ORANGBRSTD SUNBIRD 777 *RRRR* R*R*** 1 9 ***** 0
 LSR DBLCLR SUNBIRD 783 123546 544422 35 240 ***** 2432** 12
 CAPE WHITE-EYE 796 534555 655665 50 345 ***** *2421* 9
 HOUSE SPARROW 801 323443 433544 35 237 1***** *12323 12
 CAPE SPARROW 803 666766 777786 67 456 1****X *13221 36
 CAPE WEAVER 813 565777 777876 66 452 **X*X1 12231X 54
 MASKED WEAVER 814 321112 255555 30 203 X***** X11322 44
 RED BISHOP 824 11211R 113433 18 125 ***** **334* 7
 YELLOWRUMPED WIDOW 827 313213 235552 30 204 ***** **9*** 1
 COMMON WAXBILL 846 444442 345555 41 278 ***** **55* 4

PINTAILED WHYDAH 860 4211RR 124344 21 147 ***** ***** 0
 CAPE CANARY 872 443554 556666 50 341 ***** *****9* 1
 CAPE SISKIN 874 ***** *R**** 0 1 ***** ***** 0
 BULLY CANARY 877 122222 333232 23 158 ***** ***** 0
 YELLOW CANARY 878 344443 565543 41 278 ***** *3333* 4
 WHITETHRTED CANARY 879 RRRR*1 11111* 5 32 ***** ***** 0
 STREAKYHDED CANARY 881 R***R* ***** 0 3 ***** ***** 0
 CAPE BUNTING 885 111111 211211 11 77 ***** ***** 0
 R126 YLLWBLL KITE 888 *RR*** RRRRRR 1 9 ***** ***** 0
 BUDGERIGAR 890 ***RR* **RR** 1 5 ***** ***** 0
 MALLARD 891 ***** R1R*** 1 7 ***** ***** 0