AVIFAUNAL IMPACT ASSESSMENT STUDY
Scoping phase

Proposed Koeberg 2 to Stikland 400kV power lines (2)

Western Cape Province

Eskom Transmission Division
Western Region

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EXECUTIVE SUMMARY

Eskom Transmission is currently investigating several corridor options for the integration of a possible second nuclear power station close to Koeberg, into the existing transmission grid. Savannah Environmental (Pty) Ltd was appointed as the main consulting agency for the Environmental Impact Assessment process for these options. The Endangered Wildlife Trust (EWT) was appointed by Savannah to conduct a specialist avifaunal impact assessment for the proposed lines and to select the preferred routing option.

The study site falls within the Fynbos biome, and the West Strandveld bioregion (Mucina & Rutherford 2006). Vegetation units present within the various corridors include: Cape Flats Dune Strandveld, Atlantis Sand Fynbos, Swartland Shale Renosterveld, Swartland Granite Renosterveld, Cape Flats Sand Fynbos and Swartland Silcrete Renosterveld. The most dominant of these is the Atlantis Sand Fynbos.

Although the fynbos biome has a high diversity of floral species, this is not matched by the avifauna. Fynbos in fact provides habitat to a relatively low diversity of bird species. Importantly for the purpose of this study, much of the natural vegetation has been removed or altered to the point where it is no longer functional. This makes the classification of bird micro habitats more important.

The Southern African Bird Atlas Project recorded between 211 and 242 bird species in the four relevant quarter degree squares that cover the study area. The coverage (number of cards – ranging from 256 to 653) of these squares was extremely high, meaning that our confidence in the data is high. Of these species, a total of 28 Red Data species have been recorded, comprising 2 Endangered, 8 Vulnerable, and 20 Near-threatened. In addition the White Stork is considered as threatened as it is protected internationally under the Bonn Convention on Migratory Species.

Disturbance of birds and habitat destruction are anticipated to be of medium significance. Collision of birds with the proposed lines is anticipated to be of medium to high significance

Koeberg 2 to Omega Substation:

The corridor that follows the existing transmission lines is strongly preferred. The other corridor should not be considered further in the EIA phase, although it is not fatally flawed. Placing new lines adjacent to existing lines makes good sense in terms of avifaunal impacts for various reasons discussed in the main report.

Omega Substation to Muldersvlei Substation:

The southern corridor that follows existing transmission lines is strongly preferred for the same reasons as above. The northern corridor (Deviation 1) goes through a relatively undeveloped area and is not preferred avifaunally.

Koeberg – Muldersvlei - Stikland corridors:

The main corridor is preferred as it is highly developed and disturbed, and it would also mean that the lines do not need to go to Muldersvlei Substation. This is an advantage as there are several dams close to Muldersvlei which should be avoided if possible. Also, there is a site just south of Muldersvlei Substation, where a significant collision problem exists with pelicans on existing lines. This site is proving extremely difficult to mitigate (on existing infrastructure) and any new lines should avoid it if possible. The two other corridors, Deviations 1 and 2 should not be considered further as they either through areas without current power lines, or close past the high risk collision site close to Muldersvlei Substation, discussed in this report.

Muldersvlei Substation to Stikland Substation:

There are no significant avifaunal concerns along this corridor. However, if the lines do not go to Muldersvlei Substation, this corridor will not be required. The investigation of this corridor in the EIA phase will depend on how the above section is resolved.

These identified impacts will be investigated further during the EIA Phase.

DECLARATION OF CONSULTANTS' INDEPENDENCE & QUALIFICATIONS

J. Smallie (Avifaunal Specialist – Endangered Wildlife Trust) is an independent consultant to Savannah Environmental Pty (Ltd). He has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work.

Mr. Smallie is registered with The South African Council for Natural Scientific Professions (400020/06). He has ten years of experience in the field of bird interactions with electrical infrastructure and has, relevant to this study, conducted avifaunal impact assessments for two Wind Energy projects. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

1 INTRODUCTION

Eskom Transmission is currently investigating several corridor options for the integration of a possible second nuclear power station close to Koeberg, into the existing transmission grid. Savannah Environmental (Pty) Ltd was appointed as the main consulting agency for the Environmental Impact Assessment process for these options. The Endangered Wildlife Trust (EWT) was appointed by Savannah to conduct a specialist avifaunal impact assessment for the proposed lines and to select the preferred routing option.

A development of this nature could typically be expected to impact on avifauna through collision of birds with the overhead lines, destruction of bird habitat, disturbance of birds (particularly while breeding), and birds could nest, perch and roost on the new power lines which could impact on the operations of the new lines.

An initial site visit was conducted on 26 and 27 October 2009.

1.1 Terms of reference

The terms of reference for the EWT avifaunal study stipulate that the study should include the following:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project
- A description and evaluation of environmental issues and potential impacts (direct, indirect and cumulative) that have been identified.
- Direct, indirect and cumulative impacts of the identified issues must be evaluated within the Scoping Report in terms of the following criteria:
  - The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected.
  - The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) regional, national or international.
- A statement regarding the potential significance of the identified impacts, based on the impact evaluation process.
- A comparative evaluation of the identified, feasible alternative routes for the power line, with a nominated, preferred alternative for consideration in the EIA phase.
- Identification of potentially significant impacts to be assessed within the EIA phase and details of the methodology to be adopted in assessing these impacts. This should be detailed enough to include within the Plan of Study for EIA and must include a description of the proposed method of assessing the potential environmental impacts associated with the project.

1.2 Description of the proposed activity

The project consists of the following components, in each case a 5km corridor is to be assessed:

- Two 400kV lines from Koeberg 2 to the Stikland Substation (Figure 1)
- There are two route options in the section between Koeberg 2 and Omega Substation, and two options between Omega Substation and Muldersvlei Substation. Three potential routes exist between the Omega-Muldersvlei section and Stikland Substation.
- Details of the pylon structure have not been received from Eskom. It is likely that due to the built up nature of certain parts of the study area, compact double circuit type structures might be considered.

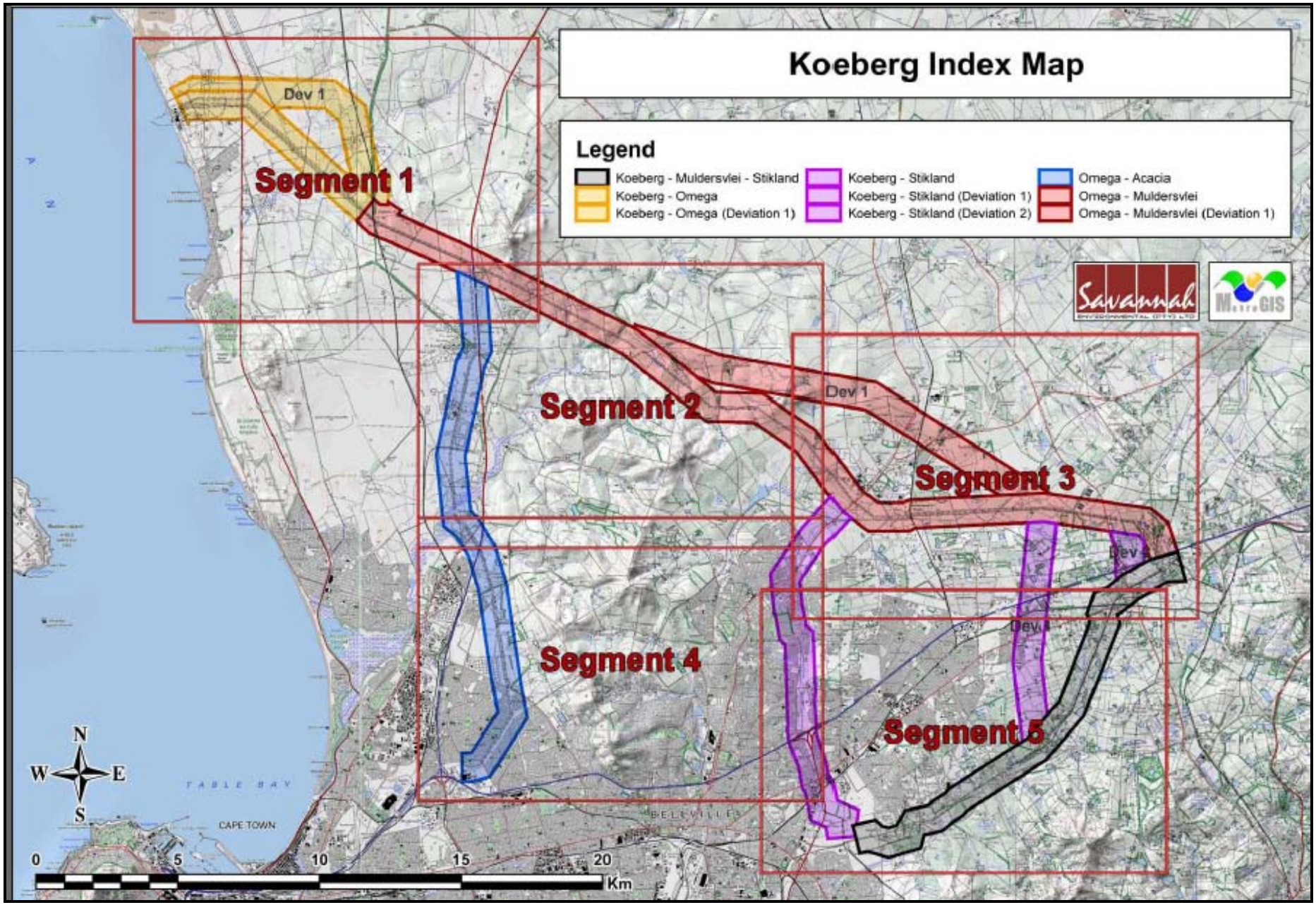

Figure 1. Layout of the study area, showing proposed power line corridors. (Map by MetroGIS)

2. METHODS

2.1 Sources of information

The following information sources were consulted in order to conduct this study:

- Bird distribution data of the Southern African Bird Atlas Project (SABAP – Harrison *et al.* 1997) for the relevant quarter-degree squares traversed by the proposed line (3318CB, 3318DA, 3318DC & 3318DD).
- Conservation status of all species considered likely to occur in the area was determined as per the most recent iteration of the national Red-list for birds (Barnes 2000).
- The power line bird mortality incident database of the Eskom - Endangered Wildlife Trust Strategic Partnership (1996 to present) was consulted to determine which of the species occurring in the study area are typically impacted by power lines and the extent to which they are affected.
- A classification of the vegetation types present in the study area was obtained from Mucina & Rutherford (2006).

2.2 Assumptions & Limitations

This study made the assumption that the above sources of information are reliable. The following factors may potentially detract from the accuracy of the predicted results:

- The SABAP data covers the period 1986-1997. Bird distribution patterns fluctuate continuously according to changes in land use, habitat quality and climatic conditions, which in turn affect levels of disturbance, and the availability of food and nesting substrates.
- Sources of error in the SABAP database, particularly inadequate coverage of some quarter degree squares.
- Difficult road access and limited time made examination of some parts of the study area from the ground difficult.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Vegetation

The study site falls within the Fynbos biome, and the West Strandveld bioregion (Mucina & Rutherford 2006). Vegetation units present within the various corridors include: Cape Flats Dune

Strandveld, Atlantis Sand Fynbos, Swartland Shale Renosterveld, Swartland Granite Renosterveld, Cape Flats Sand Fynbos and Swartland Silcrete Renosterveld. The most dominant of these is the Atlantis Sand Fynbos.

Although the fynbos biome has a high diversity of floral species, this is not matched by the avifauna. Fynbos in fact provides habitat to a relatively low diversity of bird species. Importantly for the purpose of this study, much of the natural vegetation has been removed or altered to the point where it is no longer functional. This makes the classification of bird micro habitats more important. Some of the only remaining natural Fynbos is situated within the Koeberg Nature Reserve.

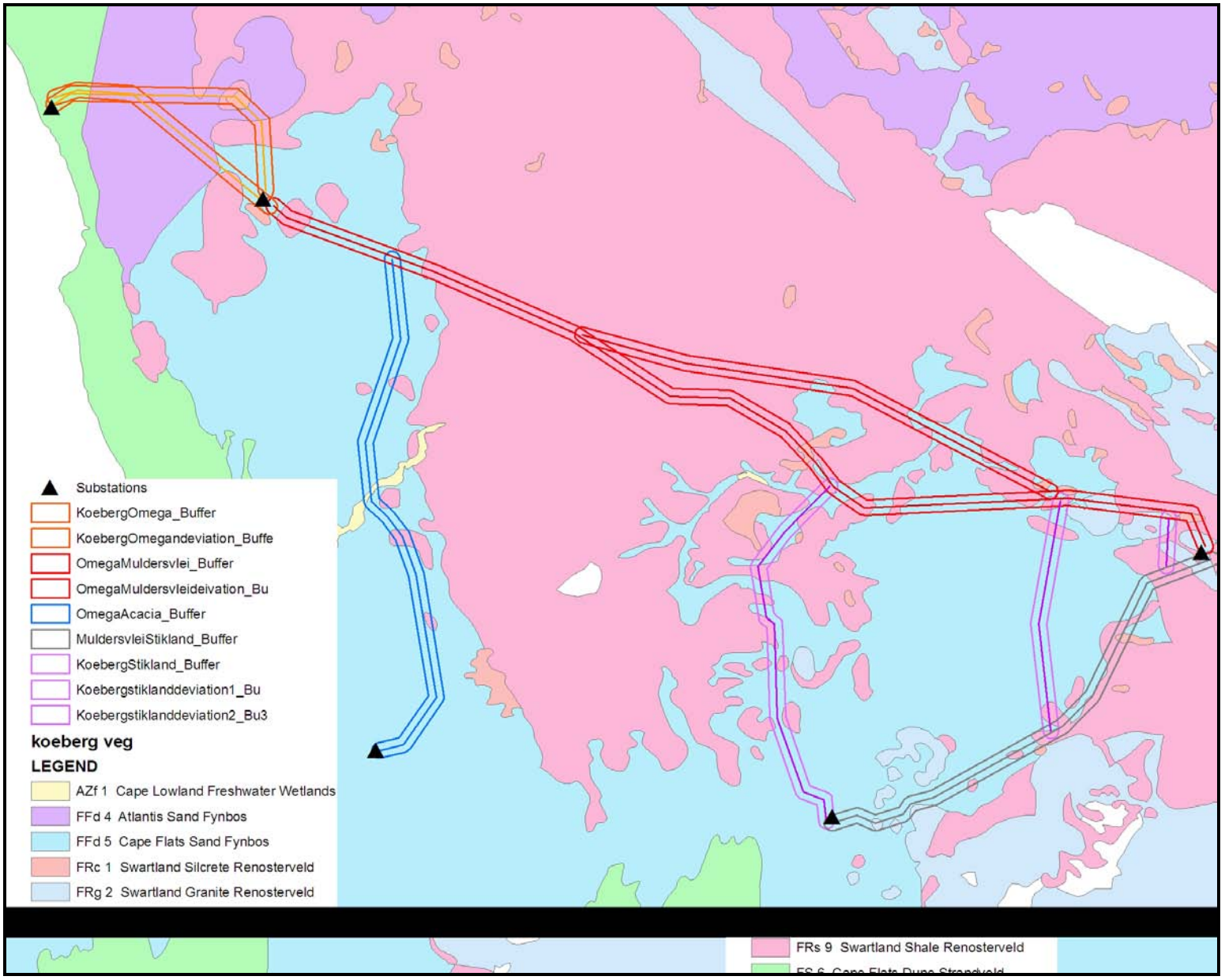

Figure 2. Vegetation classification for the study area – based on Mucina & Rutherford (2005) (Map by EWT)

3.2 Bird micro habitats

The micro habitats available to birds in the study area are of critical importance in determining the likely impacts, their significance, and the likely locations. Micro habitats are determined by a combination of factors including vegetation, topography, land use, man made structures and various others. The micro habitats available to avifauna in this study area are as follows:

Streams and drainage lines: A number of streams and drainage lines bisect the study area, and form important refuges for some species, as well as flight paths for various species.

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Wetland: Several wetlands are evident in the study area, and will attract various species as shown in Table 1.

A wetland on the main Koeberg Stikland corridor

Dams: Many thousands of earthen and other dams exist in the southern African landscape. Whilst dams have altered flow patterns of streams and rivers, and affected many bird species detrimentally, a number of species have benefited from their construction. The construction of these dams has probably resulted in a range expansion for many water bird species that were formerly restricted to areas of higher rainfall. These include the pelicans, darters and cormorants. Many species from these families occur in this study area. Perhaps most importantly, dams are used as roost sites by flocks of Blue Cranes. This has serious implications for Blue Crane interaction with vertical structures such as wind turbines and power lines, as they leave the roost in the early morning during low light conditions, and arrive at the roost in the late evening, again during low light conditions.

A typical dam, close to Muldersvlei Substation

Arable or cultivated land: These areas represent significant feeding areas for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. In particular the White Stork has a high affinity with arable lands, with 86% of sightings in South Africa recorded on arable lands (Allan 1985, Allan 1989, Allan 1997 in Hockey, Dean & Ryan 2005). The Blue Crane is also a species that will utilize the arable lands in the study area extensively. The exception to this is the vineyards, which are not attractive habitat for many bird species at all.

A wheat land

A land planted to some form of pasture

A vineyard

Arable land, resembling grassland

Alien invasive species: Several stands of Eucalyptus trees exist in the study area. In addition the area just east of Koeberg is dominated by Port Jackson trees as pictured below. These areas are not attractive to most bird species and are considered to be of low sensitivity for avifauna.

Port Jackson stand

3.3 Relevant bird populations

The Southern African Bird Atlas Project recorded between 211 and 242 bird species in the four relevant quarter degree squares. The coverage (number of cards – ranging from 256 to 653) of these squares was extremely high, meaning that our confidence in the data is high. Of these species, a total of 28 Red Data species have been recorded, comprising 2 Endangered, 8 Vulnerable, and 20 Near-threatened. In addition the White Stork is considered as threatened as it is protected internationally under the Bonn Convention on Migratory Species.

It is important to note that these species could have been recorded anywhere within these squares, not necessarily along the proposed corridors. This data does however provide us with an indication of which species can be expected in the broader area. This information coupled with an assessment of the habitats available to birds provides us with high confidence in our assessment of potential impacts.

Table 1. Recorded Red Data bird species for the quarter degree squares within which the current study area falls (Harrison *et al*, 1997)

Species	Conservation status	3318CB Report rate	3318DA Report rate	3318DC Report rate	3318DD Report rate	Preferred micro habitats	Likelihood of occurrence	Likely impacts
Total species		216	211	217	242			
# cards		256	320	686	693			
Bank Cormorant	E	18					Unlikely	
Black-rumped Buttonquail	E	0						
African Jackass Penguin	V	6					Unlikely	
Shy Mollymawk	V	0					Unlikely	
Cape Gannet	V	18					Unlikely	
Martial Eagle	V	0	2		1	Fynbos	Possible	D, C
African Marsh Harrier	V	4	2	3	1	Fynbos, wetland	Probable	D, C
Lesser Kestrel	V	0	6	1	0	Arable lands	Possible	D, C
Blue Crane	V	3	21	2	6	Arable lands, wetland, dams	Definite	D, C, HD
Wandering Albatross	V			0			Unlikely	
Southern Giant Petrel	NT	0					Unlikely	
White-chinned Petrel	NT	3					Unlikely	
Great White Pelican	NT	9	33	27	33	Dams	Definite	D, C
Cape Cormorant	NT	50					Unlikely	
Crowned Cormorant	NT	43					Unlikely	
Black Stork	NT	2	4	1	2		Unlikely	
Marabou Stork	NT				0		Unlikely	
Greater Flamingo	NT	1	32	1	1	Dams	Possible	D, C
Lesser Flamingo	NT		15	1	0	Dams	Possible	D, C
Secretarybird	NT	1	2	1	2	Arable land, fynbos	Probable	D, C
Black Harrier	NT	4	0	2	0	Fynbos, wetland	Possible	D, C, HD
Lanner Falcon	NT	2	7	6	5	Arable land	Possible	D, C
Peregrine Falcon	NT			0	0	Arable land	Possible	D, C
African Black Oystercatcher	NT	49		0	0		Unlikely	
Caspian Tern	NT	0	0	1	2	Dams	Possible	D

Greater Sheathbill	NT	1					Unlikely	
Greater Painted Snipe	NT		0	0		Dams, wetland	Possible	D
Collared Pratincole	NT		0			Arable land	Possible	D
Black-winged Pratincole	NT		1			Arable land	Possible	D
Half-collared Kingfisher	NT			0	1		Unlikely	
White Stork	Bonn		3	1	12	Arable land, wetland,	Definite	D, C

E = Endangered; V = Vulnerable; NT = Near-threatened; Bonn = Protected Internationally under the Bonn Convention on Migratory Species. D = disturbance, C = Collision, HD = habitat destruction.

Although this assessment focuses on Red Data bird species, other less threatened species will also be affected by the proposed development. The impacts on theses species have also been considered, and many of the Red Data species serve as useful surrogates for non Red Data species. Mitigation measures proposed for Red Data species will therefore also serve to protect the other species.

4 SCOPING OF IMPACTS

4.1 General description of power line impacts on birds

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with power lines (Van Rooyen 1999, Van Rooyen & Ledger 1999). Other problems are: electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure; and disturbance and habitat destruction during the construction and maintenance activities associated with electrical infrastructure.

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. The proposed power lines will not pose an electrocution risk to birds as the relevant clearances are too large for electrocution to be possible.

Collision refers to the scenario where a bird collides with the conductors or earth wires of overhead power lines. The groups of birds most severely impacted by collision with overhead lines are bustards, storks and cranes. These species are generally large, heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. An unknown number of smaller, fast-flying species – especially pursuit hunting raptors such as falcons – are also prone to colliding with power lines. Unfortunately, many collision sensitive species are considered threatened in southern Africa, and many are long-lived, slow reproducing species poorly adapted to coping with high rates of adult mortality, inflated by power line casualties. Collision is one of the impact considered to be most likely for the proposed developments and has been assessed in more detail below.

During the construction phase and maintenance of power lines and substations, some **habitat destruction** and alteration inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the leveling of substation yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimise the risk of fire under the line which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude through modification of habitat. Similarly, these activities impact on birds through **disturbance**, particularly during the bird's breeding activities. These impacts have been assessed in more detail below.

4.2 Description of the anticipated impacts of the proposed power line on birds

Disturbance of birds during construction and maintenance, particularly breeding species

Nature of the Impact: Disturbance of birds during construction and maintenance		
	Without Mitigation	**With Mitigation**
Spatial Extent	Local – site & immediate surrounds only	Local
Significance	**Medium – particularly breeding species**	**Medium to low**
Status (positive or negative)	Negative	Negative

Habitat destruction during construction and maintenance

Nature of the Impact: Habitat destruction during construction and maintenance		
	Without Mitigation	**With Mitigation**
Spatial Extent	Local – site & associated infrastructure	Local
Significance	**Medium to low**	**Medium to low**
Status (positive or negative)	Negative	Negative

Collision of birds with power lines

Nature of the Impact: Collision with transmission lines		
	Without Mitigation	**With Mitigation**
Spatial Extent	Impact will occur locally, but have national implications for certain species	Impact will occur locally, but have national implications for certain species
Significance	**Medium to high**	**Medium**
Status (positive or negative)	Negative	Negative

5. SELECTION OF A PREFERRED ROUTE FOR THE LINE

Koeberg 2 to Omega Substation:

The corridor that follows the existing transmission lines is strongly preferred. The other corridor is not preferred in terms of avifauna. Placing new lines adjacent to existing lines makes good sense in terms of avifaunal impacts for the following reasons:

- The more overhead power lines there are together, the more visible they would be to the birds in the area (Avian Power Line Interaction Committee - 1994). This would partially mitigate for the impact of bird collision.
- Resident birds in an area become accustomed to a power line that crosses their flight paths, and learn to avoid it during their everyday activities. Hence adding a new power line adjacent to an existing line would probably have less impact than putting it in a totally new area, where the resident birds are not yet accustomed to overhead power lines.
- Spatially, it makes more sense to have all the threats to birds (in particular through collision) in one relatively confined area, rather than spread out across the landscape.
- Building the new line adjacent to an existing line should eliminate the need for new access roads and gates etc, and therefore reduce the levels of disturbance and habitat destruction.

Omega Substation to Muldersvlei Substation:

The southern corridor that follows existing transmission lines is strongly preferred for the same reasons as above. The northern corridor (Deviation 1) goes through a relatively undeveloped area and is not preferred in terms of avifauna.

Koeberg – Muldersvlei - Stikland corridors:

The main corridor is preferred as it is highly developed and disturbed, and it would also mean that the lines do not need to go to Muldersvlei Substation. This is an advantage as there are a series of dams close to Muldersvlei which should be avoided if possible. Also, there is a site just south of Muldersvlei Substation, where a significant collision problem exists with pelicans on existing lines. This site is proving extremely difficult to mitigate (on existing infrastructure) and any new lines should avoid it if possible. The two other corridors, Deviations 1 and 2 are not preferred in terms of avifauna.

Muldersvlei Substation to Stikland Substation:
There are no significant avifaunal concerns along this corridor. However, if the lines do not go to Muldersvlei, this corridor will not be required. The investigation of this corridor in the EIA phase will depend on how the above section is resolved.

The overall preferred route for the two proposed power lines is shown in Figure 3 below.

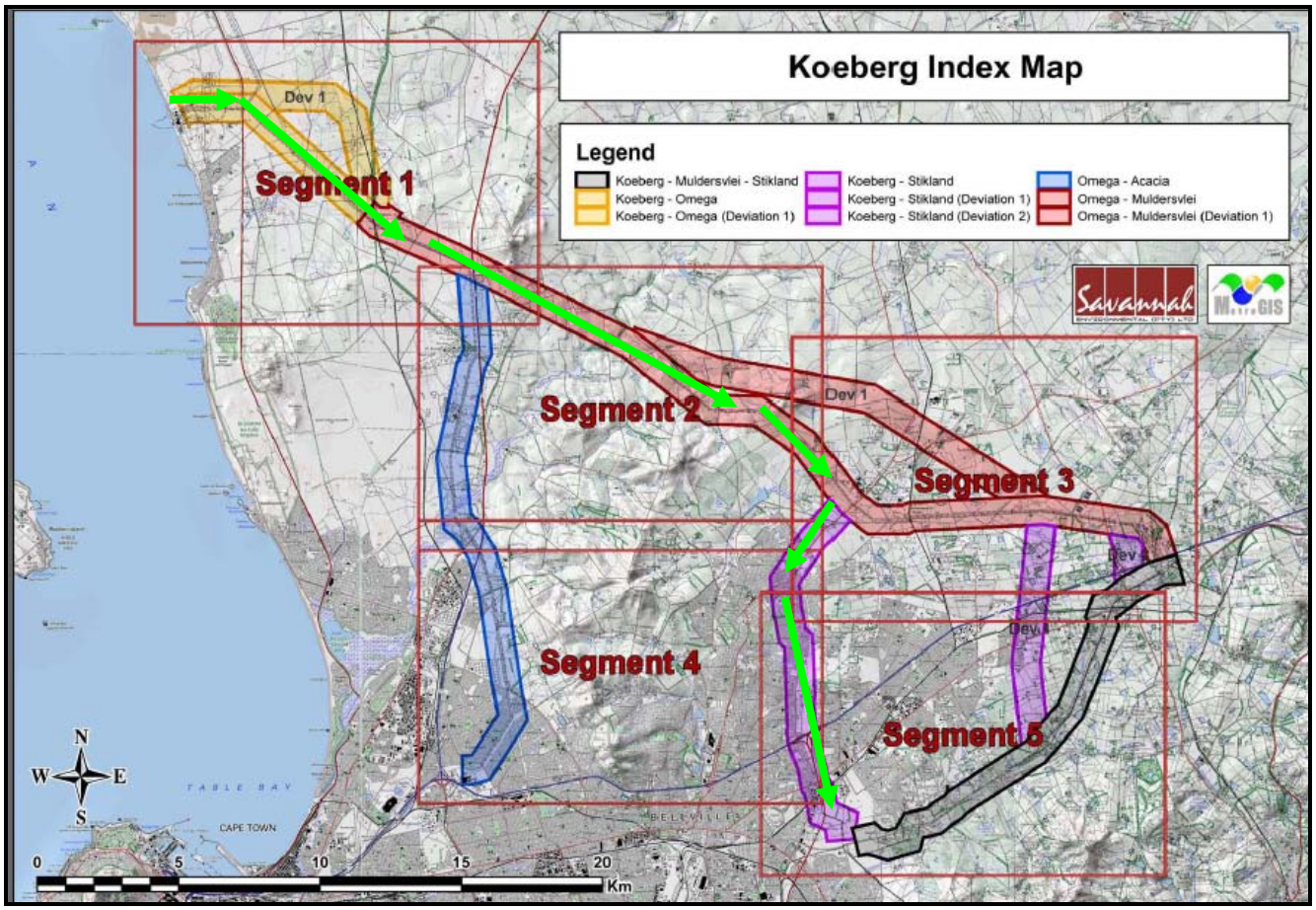

Figure 3. Consolidated preferred route for the two proposed power lines.

6. PLAN OF STUDY FOR EIA

The scoping phase has identified potential avifaunal issues associated with the proposed developments. The EIA Phase will include the following components:

- All identified issues will be investigated in more detail during the EIA phase according to the prescribed criteria.
- Further field work will be conducted if necessary, to assess the various micro habitats available, their sensitivity and relevance. Suitable buffers from those habitats needing protection will be determined.

- Landscape factors relevant to this study will be investigated further.
- Field work will facilitate the compilation of a broader suite of species (including non Red Data species) that are relevant to this development.
- Suitable mitigation measures will be recommended for all issues identified as significant.
- A monitoring programme will be compiled for both the construction and operational phase of the development.

7. REFERENCES

Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute. Washington D.C.

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

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V & Brown, C.J. (eds). 1997. The atlas of southern African birds. Vol 1 & 2. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (eds). 2005. Roberts birds of southern Africa, VII. John Voelcker Bird Book Fund, Cape Town.

Mucina. L. & Rutherford, M.C. (Eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Van Rooyen, C.S. 1999. An overview of the Eskom-EWT Strategic Partnership in South Africa. EPRI Workshop on avian interactions with utility structures, 2-3 December 1999, Charleston, South Carolina.

Van Rooyen, C.S. & Ledger, J.A. 1999. Birds and utility structures: developments in southern Africa. In: Ferrer, M. & Janns, G.F.M. (eds). Birds and powerlines. Quercus, Madrid. Pp 205-230.

Young, D.J., Harrison, J.A., Navarro, R.A., Anderson, M.D. & Colahan, B.D. (eds). 2003. Big birds on farms: Mazda CAR Report 1993-2001. Avian Demography Unit, Cape Town.