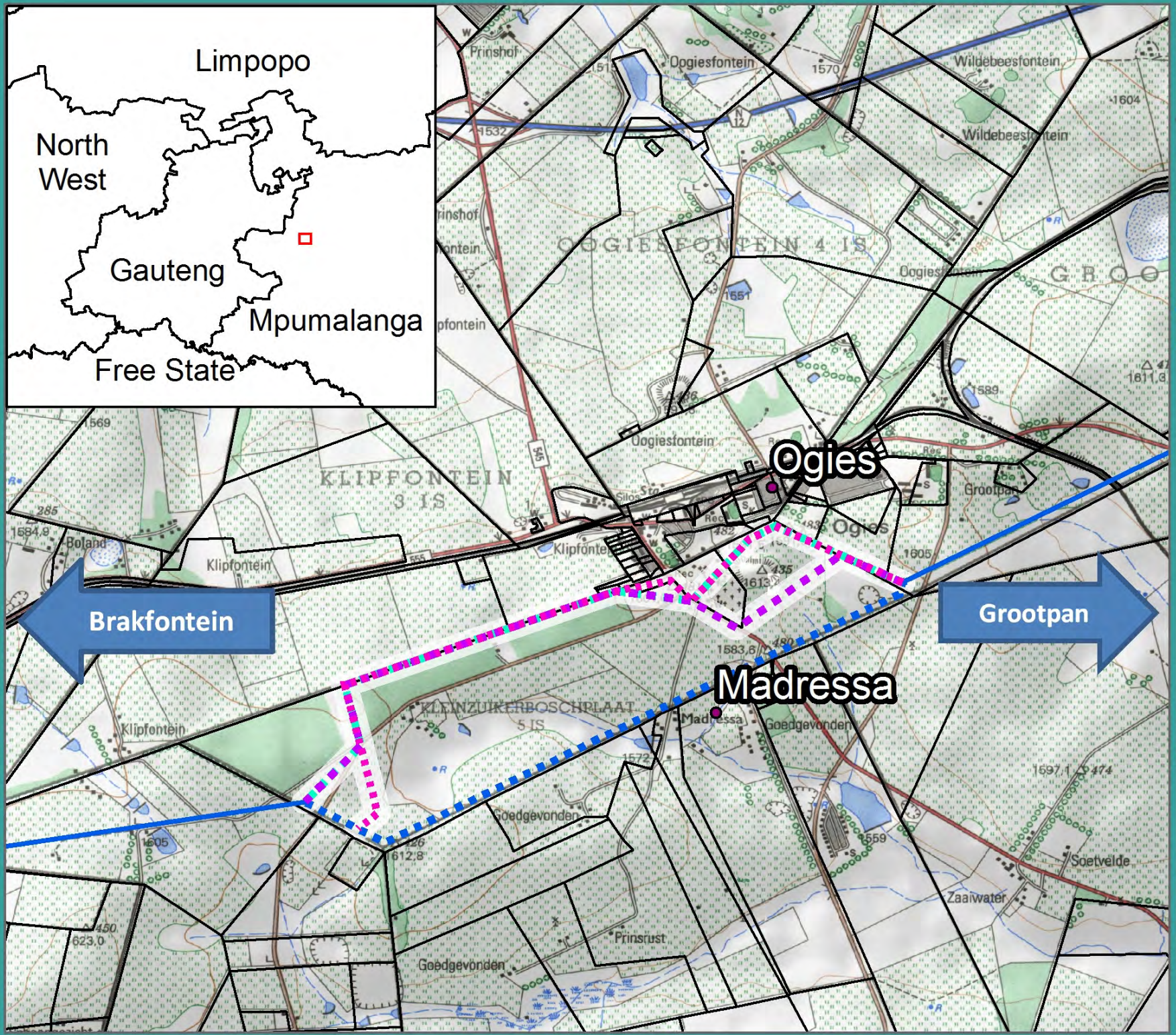
APPENDIX A

MAPS

APPENDIX A1

LOCALITY MAP



Grootpan – Brakfontein Power Lines BA

Legend

- Alternative 1 (Preferred)
- Alternative 2
- Alternative 3
- Existing Powerline
- Portion to be dismantled

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

1 Kilometers

N

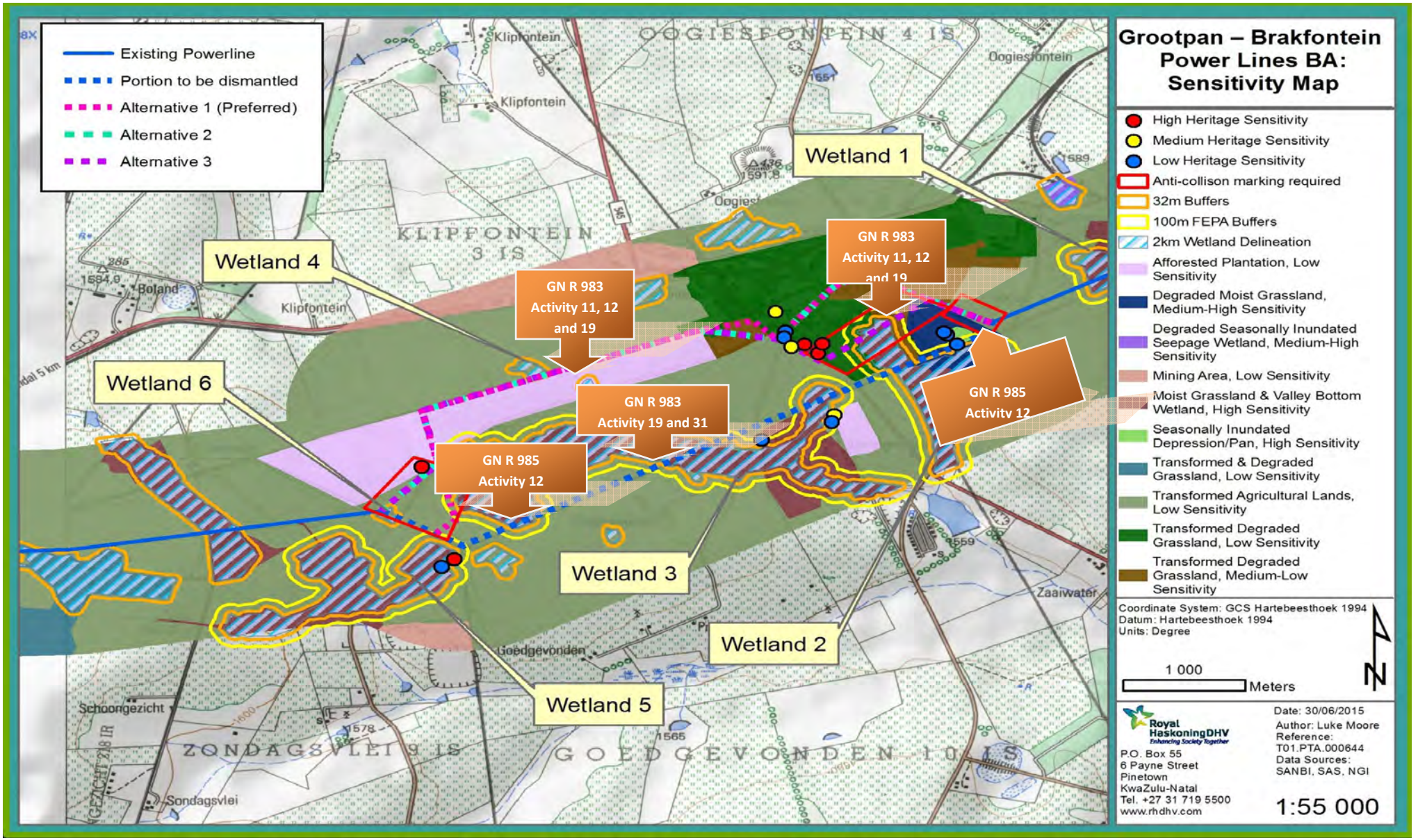
Royal HaskoningDHV
Enhancing Society Together
P.O. Box 55
6 Payne Street
Pinetown
KwaZulu-Natal
Tel. +27 31 719 5500
www.rhdhv.com

Date: 18/06/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: Land Affairs, MDB

1:60 000

APPENDIX A2

ROUTE PLAN



Grootpan – Brakfontein Power Lines BA: Sensitivity Map

- High Heritage Sensitivity
- Medium Heritage Sensitivity
- Low Heritage Sensitivity
- Anti-collison marking required
- 32m Buffers
- 100m FEPA Buffers
- 2km Wetland Delineation
- Afforested Plantation, Low Sensitivity
- Degraded Moist Grassland, Medium-High Sensitivity
- Degraded Seasonally Inundated Seepage Wetland, Medium-High Sensitivity
- Mining Area, Low Sensitivity
- Moist Grassland & Valley Bottom Wetland, High Sensitivity
- Seasonally Inundated Depression/Pan, High Sensitivity
- Transformed & Degraded Grassland, Low Sensitivity
- Transformed Agricultural Lands, Low Sensitivity
- Transformed Degraded Grassland, Low Sensitivity
- Transformed Degraded Grassland, Medium-Low Sensitivity

Coordinate System: GCS Hartebeesthoek 1994
Datum: Hartebeesthoek 1994
Units: Degree

1 000 Meters

N

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Date: 30/06/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: SANBI, SAS, NGI

1:55 000

APPENDIX A3

SENSITIVITY MAP

Grootpan – Brakfontein Power Lines BA: Sensitivity Map

Existing Powerline
Portion to be dismantled
Alternative 1 (Preferred)
Alternative 2
Alternative 3

Wetland 1
Wetland 2
Wetland 3
Wetland 4
Wetland 5
Wetland 6

High Heritage Sensitivity
Medium Heritage Sensitivity
Low Heritage Sensitivity
Anti-collison marking required
32m Buffers
100m FEPA Buffers
2km Wetland Delineation
Afforested Plantation, Low Sensitivity
Degraded Moist Grassland, Medium-High Sensitivity
Degraded Seasonally Inundated Seepage Wetland, Medium-High Sensitivity
Mining Area, Low Sensitivity
Moist Grassland & Valley Bottom Wetland, High Sensitivity
Seasonally Inundated Depression/Pan, High Sensitivity
Transformed & Degraded Grassland, Low Sensitivity
Transformed Agricultural Lands, Low Sensitivity
Transformed Degraded Grassland, Low Sensitivity
Transformed Degraded Grassland, Medium-Low Sensitivity

Coordinate System: GCS Hartebeesthoek 1994
Datum: Hartebeesthoek 1994
Units: Degree

1 000 Meters

N

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Tel. +27 31 719 5500
www.rhdhv.com

Date: 30/06/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: SANBI, SAS, NGI

1:55 000

Grootpan – Brakfontein Power Lines BA: Alternative 1 Sensitivity Map

Existing Powerline
Portion to be dismantled
Alternative 1 (Preferred)

Wetland 4
Wetland 3
Wetland 6
Wetland 2
Wetland 5

CD:NGI

- High Heritage Sensitivity
- Medium Heritage Sensitivity
- Low Heritage Sensitivity
- Anti-collison marking required
- 32m Buffers
- 100m FEPA Buffers
- 2km Wetland Delineation
- Afforested Plantation, Low Sensitivity
- Degraded Moist Grassland, Medium-High Sensitivity
- Mining Area, Low Sensitivity
- Moist Grassland & Valley Bottom Wetland, High Sensitivity
- Seasonally Inundated Depression/Pan, High Sensitivity
- Transformed Agricultural Lands, Low Sensitivity
- Transformed Degraded Grassland, Low Sensitivity
- Transformed Degraded Grassland, Medium-Low Sensitivity

Coordinate System: GCS Hartebeesthoek 1994
Datum: Hartebeesthoek 1994
Units: Degree

600
Meters

N

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KwaZulu-Natal
Tel. +27 31 719 5500
www.rhdhv.com

Date: 03/07/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: SANBI, SAS, NGI

1:33 000

Grootpan – Brakfontein Power Lines BA: Alternative 2 Sensitivity Map

Existing Powerline
Portion to be dismantled
Alternative 2

Wetland 4
Wetland 3
Wetland 2
Wetland 6
Wetland 5

CD:NGI

- High Heritage Sensitivity
- Medium Heritage Sensitivity
- Low Heritage Sensitivity
- Anti-collison marking required
- 32m Buffers
- 100m FEPA Buffers
- 2km Wetland Delineation
- Afforested Plantation, Low Sensitivity
- Degraded Moist Grassland, Medium-High Sensitivity
- Mining Area, Low Sensitivity
- Moist Grassland & Valley Bottom Wetland, High Sensitivity
- Seasonally Inundated Depression/Pan, High Sensitivity
- Transformed Agricultural Lands, Low Sensitivity
- Transformed Degraded Grassland, Low Sensitivity
- Transformed Degraded Grassland, Medium-Low Sensitivity

Coordinate System: GCS Hartebeesthoek 1994
Datum: Hartebeesthoek 1994
Units: Degree

600
Meters

N

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Pinetown
KwaZulu-Natal
Tel. +27 31 719 5500
www.rhdhv.com

Date: 03/07/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: SANBI, SAS, NGI

1:33 000

Grootpan – Brakfontein Power Lines BA: Alternative 3 Sensitivity Map

Existing Powerline
Portion to be dismantled
Alternative 3

Wetland 4
Wetland 3
Wetland 6
Wetland 5
Wetland 2

CD:NGI

- High Heritage Sensitivity
- Medium Heritage Sensitivity
- Low Heritage Sensitivity
- Anti-collison marking required
- 32m Buffers
- 100m FEPA Buffers
- 2km Wetland Delineation
- Afforested Plantation, Low Sensitivity
- Degraded Moist Grassland, Medium-High Sensitivity
- Mining Area, Low Sensitivity
- Moist Grassland & Valley Bottom Wetland, High Sensitivity
- Seasonally Inundated Depression/Pan, High Sensitivity
- Transformed Agricultural Lands, Low Sensitivity
- Transformed Degraded Grassland, Low Sensitivity
- Transformed Degraded Grassland, Medium-Low Sensitivity

Coordinate System: GCS Hartebeesthoek 1994
Datum: Hartebeesthoek 1994
Units: Degree

600
Meters

N

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KwaZulu-Natal
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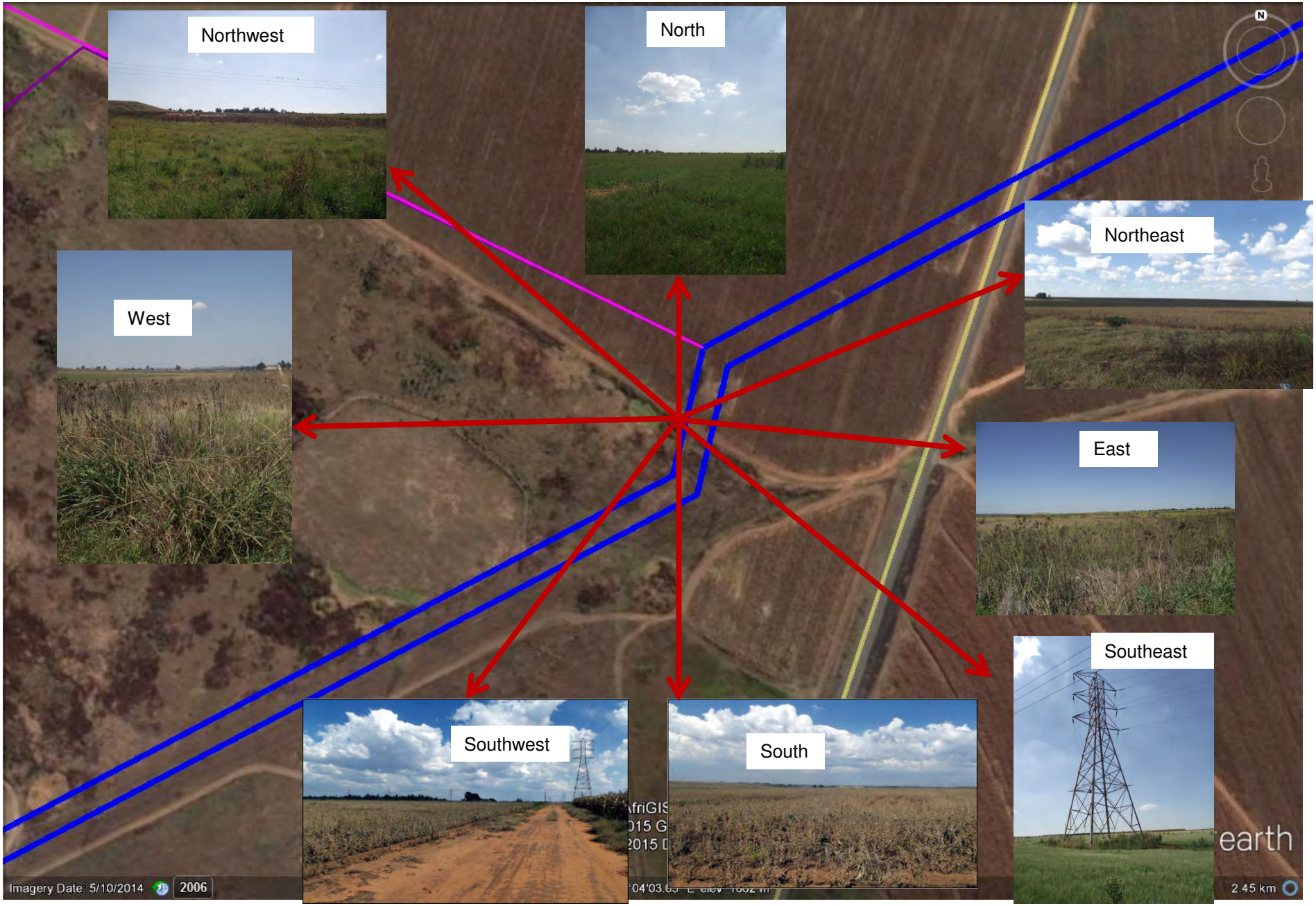
Date: 03/07/2015
Author: Luke Moore
Reference: T01.PTA.000644
Data Sources: SANBI, SAS, NGI

1:33 000

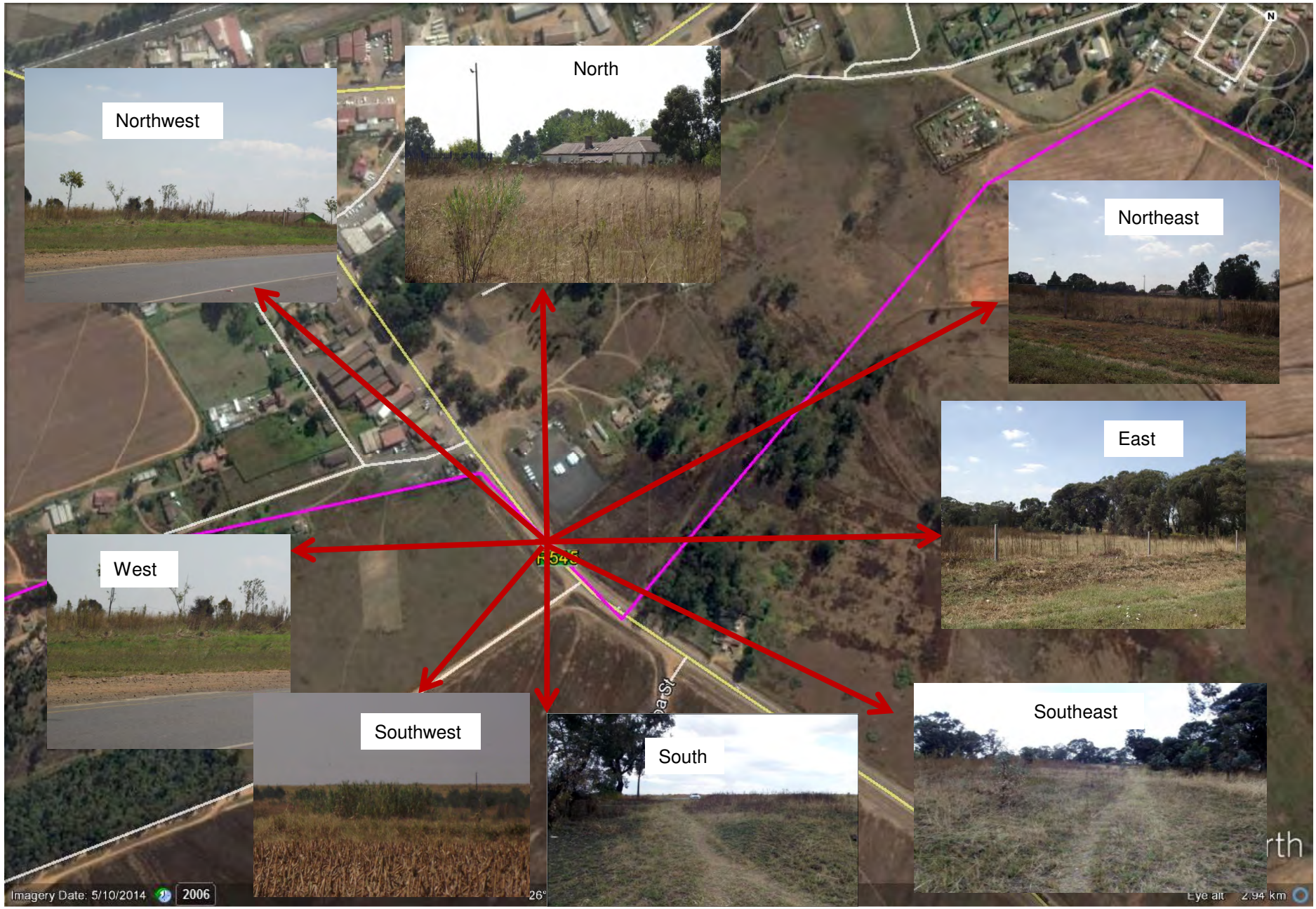
APPENDIX B

PHOTOGRAPHS

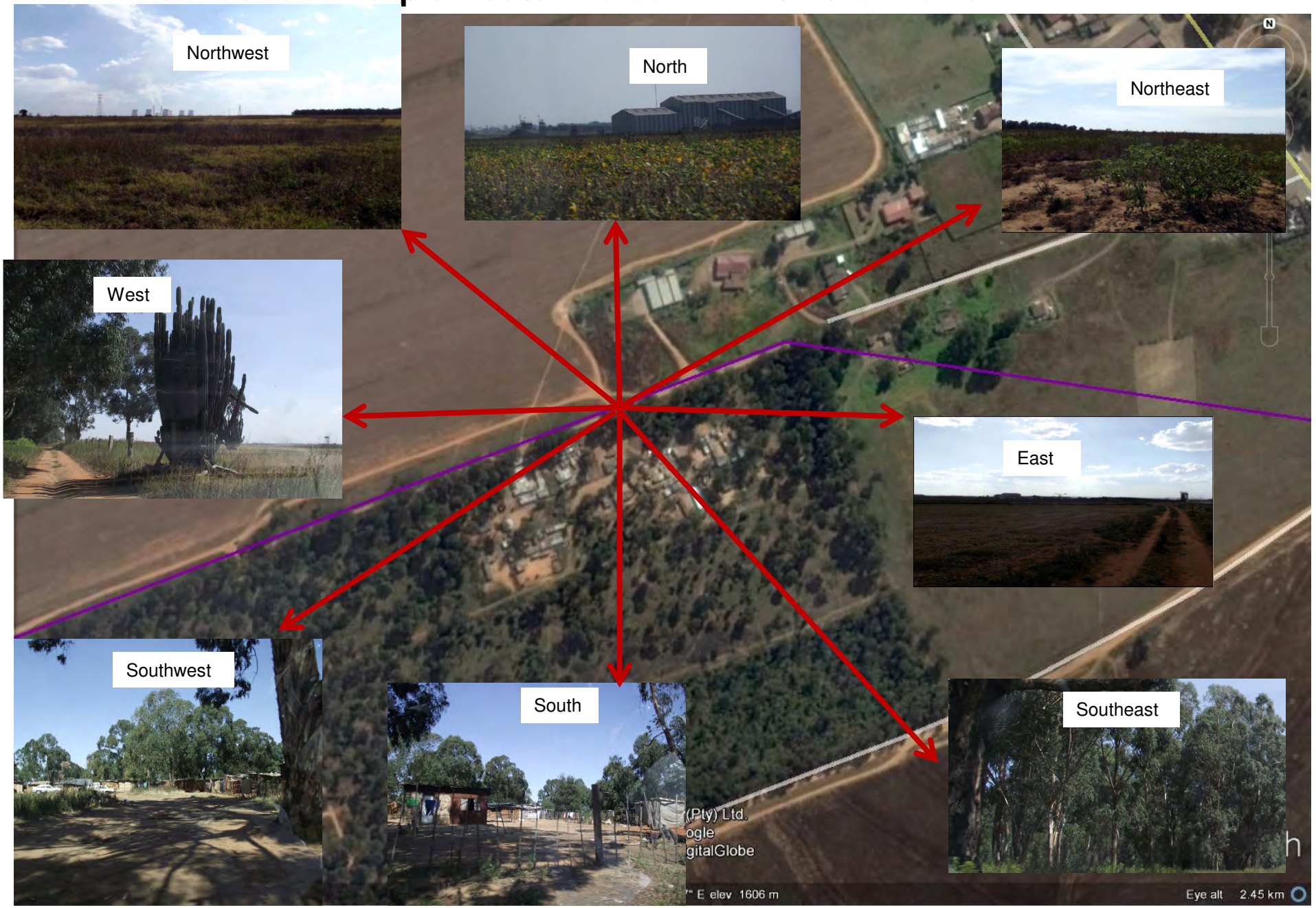
Dismantled Portion of Existing Line - 26º03‘25.16"S 29º04‘04.09"E



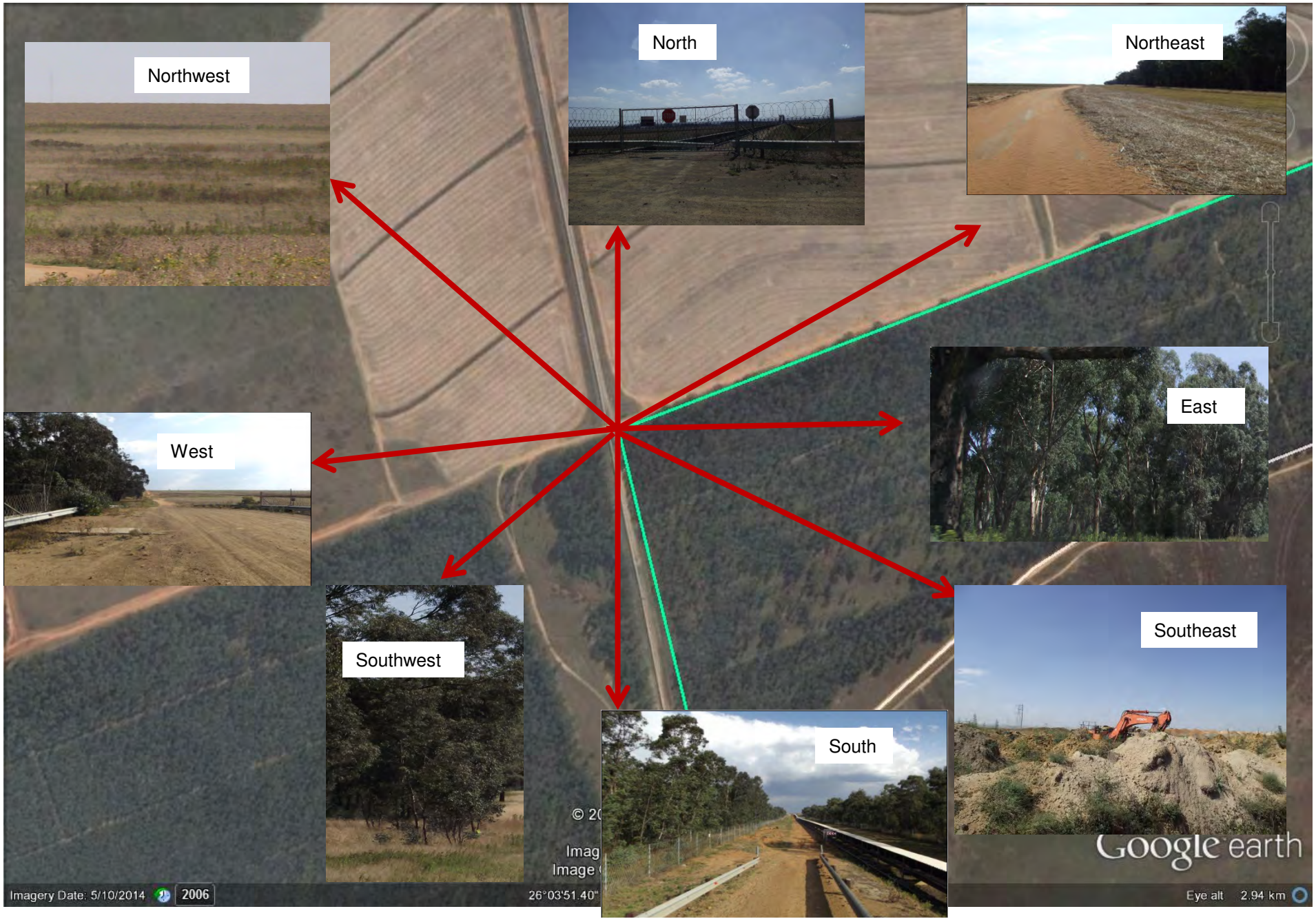
Alternative 1: Pink Route - 26º03’27.59"S 29º03‘07.35"E



Alternative 2: Purple Route - 26º03‘27.22"S 29º02‘40.15"E

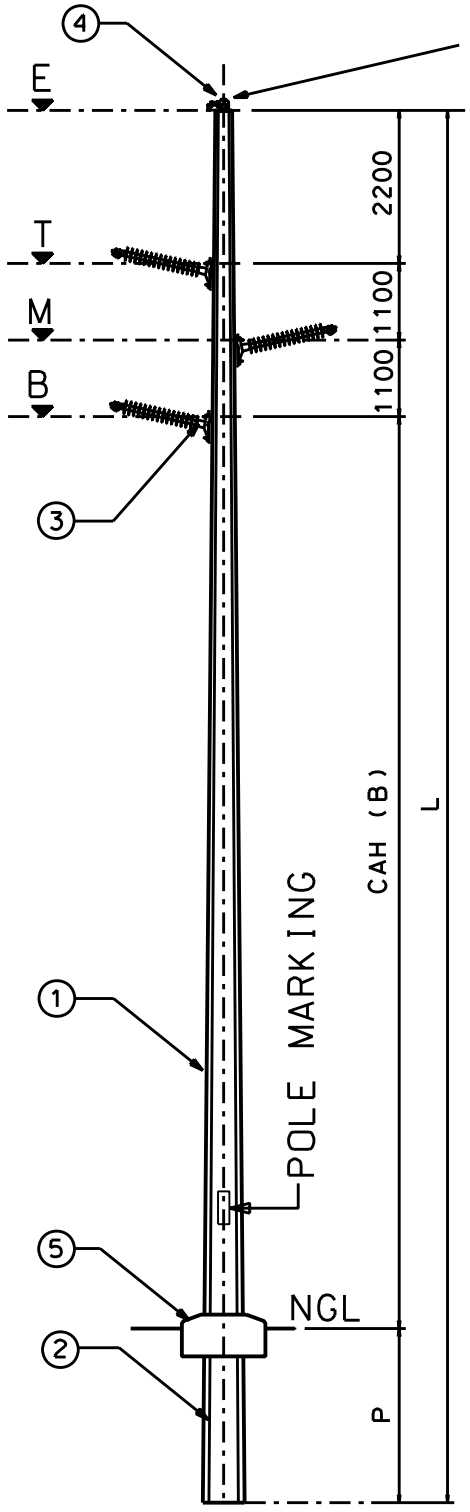


Alternative 3: Green Route - 26º03‘50.45"S 29º01‘33.30"E



APPENDIX C

FACILITY ILLUSTRATION



TIP LOAD = 23 kN

DESIGN REQUIREMENTS						
POLE LENGTH L	TIP LOAD (kN)	PLANTING DEPTH P	C A H (m AGL)			
			E	T	M	B
20	23	2.6	17.4	15.2	14.1	13.0
21	23	2.7	18.3	16.1	15.0	13.9
22	23	2.8	19.2	17.0	15.9	14.8
23	23	2.9	20.1	17.9	16.8	15.7
24	23	3.0	21.0	18.8	17.7	16.6

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
2	DRG SHT UPDATED. REFERENCES REV'D. GENERAL REVISION	SLR	RAB	AB	JUNE 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY

RETICULATION/SUB-TRANSMISSION LINES
88/132KV S/C INTERMEDIATE STRUCTURE
GENERAL ARRANGEMENT

D-DT 7611	SET	SHEET	REVISION
	2	1	2

A4L

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ITEM NØ.	DESCRIPTION	D-DT NØ.
	STRUCTURE	
	TYPE 259A	D-DT 7611
	MANUFACTURER: STRUCTATECH	
	TYPE 261A	D-DT 7611
	MANUFACTURER: CIS	
1	POLE LENGTH (BODY)	
	20m STEEL	D-DT 7100
	21m STEEL	D-DT 7100
	22m STEEL	D-DT 7100
	23m STEEL	D-DT 7100
	24m STEEL	D-DT 7100
2	FOUNDATION	
	TYPE 1 (300kPa)	D-DT 7850 SHT 2
	TYPE 2 (150kPa)	D-DT 7850 SHT 3
	TYPE 3 (100kPa)	D-DT 7850 SHT 4
	TYPE 4 (50kPa)	D-DT 7850 SHT 5
	ROCK & SOFT ROCK	D-DT 7850 SHT 1
	ALTERNATE FOUNDATIONS	D-DT 7851
3	INSULATOR ASSEMBLY	
	INTERMEDIATE ASSEMBLY	D-DT 7321
4	EARTH WIRE ASSEMBLIES	
	NON INSULATED	D-DT 7326
	INSULATED	D-DT 7327
5	CONCRETE CAP AND	D-DT 7857
	EARTHING DETAILS	

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLR	RAB	AB	JUNE 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: SLR
DATE: JAN 2004

DISTRIBUTION TECHNOLOGY

RETICULATION/SUB-TRANSMISSION LINES
88/132KV S/C INTERMEDIATE STRUCTURE
REFERENCE TABLE

	SET	SHEET	REVISION
D-DT 7611	2	2	2

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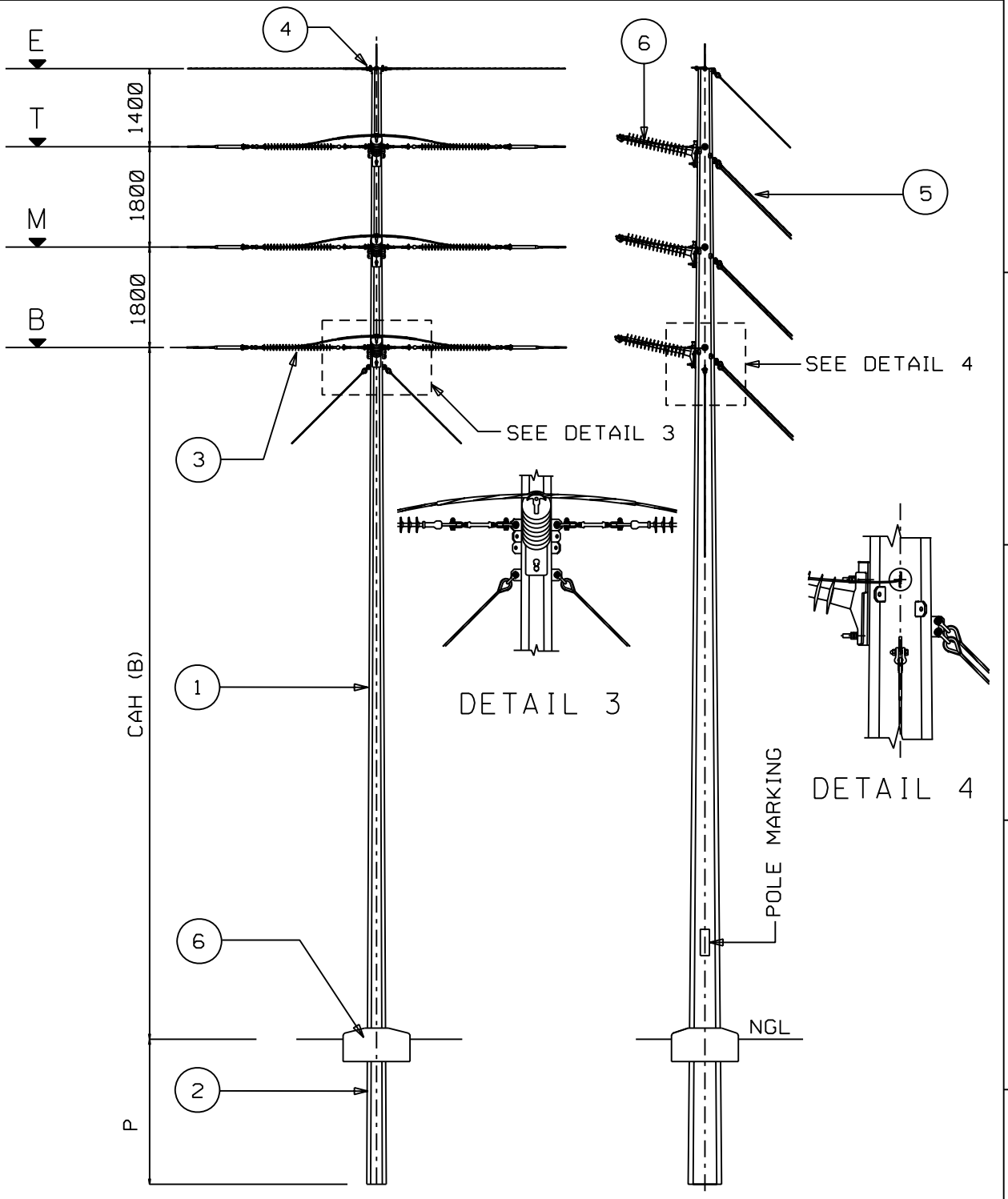

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
3	SHEET 3 ITEM 2 FOUNDATION DRG. NO.S CORRECTED	P.A.T.	S.MASHABA	B.BRANFIELD	19.03.2010	
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLR	RAB	AB	MARCH 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY

RETICULATION/SUB-TRANSMISSION LINES
STAYED ANGLE STRAIN STRUCTURE
GENERAL ARRANGEMENT (0-90°)

D-DT 7615	SET	SHEET	REVISION
	3	1	3

A4L

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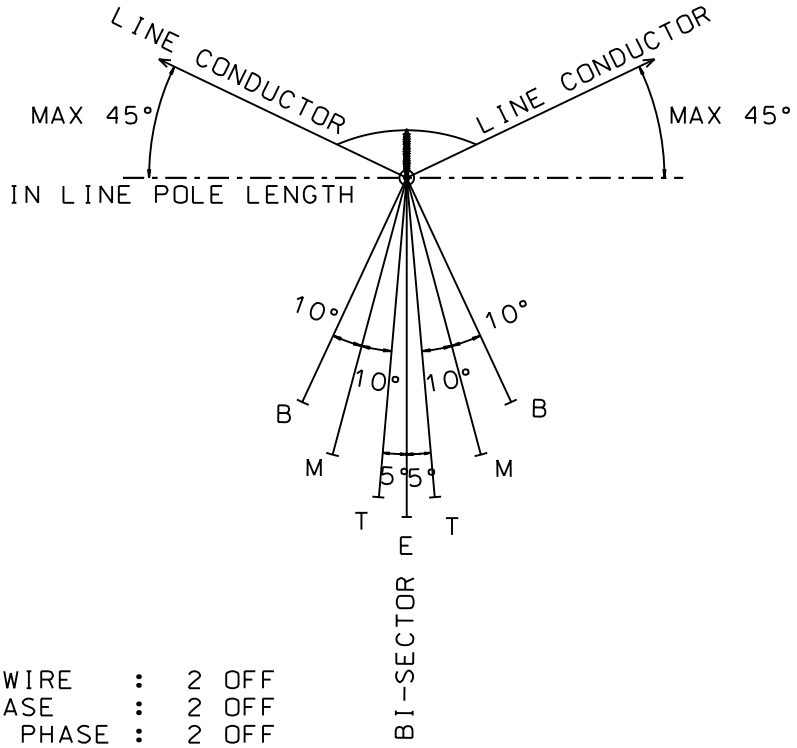

8 STAYS
E) EARTH WIRE : 2 OFF
T) TOP PHASE : 2 OFF
M) MIDDLE PHASE : 2 OFF
B) BOTTOM PHASE : 2 OFF

TOP VIEW

STAY ARRANGEMENT FOR STAYED STRUCTURES

SCHEDULE FOR CONDUCTOR ATTACHMENT HEIGHTS

DESIGN REQUIREMENTS			C A H (m AGL)			
POLE LENGTH L	TIP LOAD (kN)	PLANTING DEPTH P	E	T	M	B
18	23	2,0	16,0	14,6	12,8	11,0
19	23	2,0	17,0	15,6	13,8	12,0
20	23	2,0	18,0	16,6	14,8	13,0
21	23	2,0	19,0	17,6	15,8	14,0
22	23	2,0	20,0	18,6	16,8	15,0
23	23	2,0	21,0	19,6	17,8	16,0
24	23	2,0	22,0	20,6	18,8	17,0

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
3	SHEET 3 ITEM 2 FOUNDATION DRG. NO.S CORRECTED	P.A.T.	S.MASHABA	B.BRANFIELD	19.03.2010	
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLR	RAB	AB	MARCH 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY

RETICULATION/SUB-TRANSMISSION LINES
STAYED ANGLE STRAIN STRUCTURE
DESIGN CRITERIA & STAYS (Ø-90°)

	SET	SHEET	REVISION
D-DT 7615	3	2	3

A4L

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ITEM NØ.	DESCRIPTION	D-DT NØ.
	STRUCTURE	
	TYPE 259D	D-DT 7615
	MANUFACTURER: STRUCTATECH	
	TYPE 261D	D-DT 7615
	MANUFACTURER: CIS	
1	POLE LENGTH (BODY)	
	18m STEEL	D-DT 7104
	19m STEEL	D-DT 7104
	20m STEEL	D-DT 7104
	21m STEEL	D-DT 7104
	22m STEEL	D-DT 7104
	23m STEEL	D-DT 7104
	24m STEEL	D-DT 7104
2	FOUNDATION	
	TYPE 1 (300kPa)	D-DT 7851 SHT 2
	TYPE 2 (150kPa)	D-DT 7851 SHT 3
	TYPE 3 (100kPa)	D-DT 7851 SHT 4
	TYPE 4 (50kPa)	D-DT 7851 SHT 5
	ROCK & SOFT ROCK	D-DT 7851 SHT 1
3	INSULATOR ASSEMBLY	
	STRAIN ASSEMBLY	D-DT 7311
4	EARTH WIRE ASSEMBLIES	
	STRAIN NON INSULATED	D-DT 7323
	STRAIN INSULATED	D-DT 7324
5	STAY ASSEMBLY/LOCATION	D-DT 7325/7346
6	JUMPER ASSEMBLY	D-DT 7321
7	CONCRETE CAP AND EARTHING	D-DT 7857

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
3	SHEET 3 ITEM 2 FOUNDATION DRG. NO.S CORRECTED	P.A.T.	S.MASHABA	B.BRANFIELD	19.03.2010	
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLR	RAB	AB	MARCH 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY

RETICULATION/SUB-TRANSMISSION LINES
STAYED ANGLE STRAIN STRUCTURE
REFERENCE TABLE (Ø-90°)

D-DT 7615	SET	SHEET	REVISION
	3	3	3

A4L

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APPENDIX D

SPECIALIST REPORTS

APPENDIX D1

AVIFAUNAL IMPACT ASSESSMENT

Grootpan Brakfontein 88KV Power lines

Avifaunal Impact Assessment

27th May 2015

Compiled by:
WildSkies Ecological Services (Pty) Ltd
Luke Strugnell
luke@wildskies.co.za

Submitted to:
RHDV (Pty) Ltd
Nicole Botham
Nicole.Botham@rhdv.com

EXECUTIVE SUMMARY

This project involves the removal of an existing power line and the re-routing of two new 88KV Power lines in order to remove the ESKOM power lines from the footprint of the Glencore mine. The project area is situated just south of Ogies in Mpumalanga Province of South Africa.

The new lines will follow a 2 kilometre servitude from Grootpan to Brakfontein in Ogies.

A site visit was conducted on the 14th May 2015 to assess the area and any micro-habitats that would be an attractant for birds.

In total 15 Red List species were recorded in the broader area previously by the Southern African Bird Atlas Project 1 and 2 (Harrison *et al*, 1997; and www.sabap2.adu.org.za), comprising 1 Critically Endangered, 3 Endangered, 4 Vulnerable and 7 Near Threatened species (Taylor, 2014). There is also 1 Bonn listed species present in the broader study area.

The proposed project can proceed with minimal impact on avifauna. The main findings of this report include the fact that certain areas will require marking with anti-collision marking devices. This is due to the historical presence of some collision sensitive species in the area. Furthermore the steel monopole design must be used to mitigate against electrocutions. Standard EMP principles must be followed to mitigate for the impact of habitat destruction and disturbance on avifauna and should this be done the project may proceed with minimal impact on avifauna.

A site specific EMP is required to search for nesting sites and the general presence of African Grass Owl in the area. Once Eskom have decided on the preferred alternative this must be walked along with the existing power line that is to be dismantled. Should African Grass Owl be found during this walk down suitable recommendations will be given in a report following this phase of the project. During this avifaunal walk down the specific sections of line requiring marking with anti-collision marking devices will be further refined.

There is a slight preference for option 1 when it comes to the routing alternatives but all three alternatives are possible from an avifaunal perspective.

If at all possible the large stands of eucalyptus trees should be kept in position and not impacted upon during construction. This is to mitigate for any birds nesting or roosting within these trees.

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DECLARATION OF INDEPENDENCE

The Natural Scientific Professions Act of 2003 aims to "Provide for the establishment of the South African Council of Natural Scientific Professions (SACNASP) and for the registration of professional, candidate and certified natural scientists; and to provide for matters connected therewith."

"Only a registered person may practice in a consulting capacity" – Natural Scientific Professions Act of 2003 (20(1)-pg. 14)

Investigator:	Luke Strugnell (Pri.Sci.Nat)
Qualification:	BSc (hons) Zoology.
Affiliation:	South African Council for Natural Scientific Professions
Registration number:	400181/09
Fields of Expertise:	Zoological Science
Registration:	Professional Member

All specialist investigators specified above declare that:

- We act as independent specialists for this project.
- We consider ourselves bound by the rules and ethics of the South African Council for Natural Scientific Professions.
- We do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2006.
- We will not be affected by the outcome of the environmental process, of which this report forms part of.
- We do not have any influence over the decisions made by the governing authorities.
- We do not object to or endorse the proposed developments, but aim to present facts and our best scientific and professional opinion with regard to the impacts of the development.
- We undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2006.
- Should we consider ourselves to be in conflict with any of the above declarations, we shall formally submit a Notice of Withdrawal to all relevant parties and formally register as an Interested and Affected Party.

Terms and Liabilities

- This report is based on a short term investigation using the available information and data related to the site to be affected. No long term investigation or monitoring was conducted.
- The Precautionary Principle has been applied throughout this investigation.

- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist investigator withholds the right to amend this report, recommendations and conclusions at any stage should additional information become available.
- Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist investigator as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

Signed on 27th May 2015 by Luke Strugnell in his capacity as specialist investigator

1. INTRODUCTION

1.1. Background

This project involves the removal of an existing power line and the re-routing of two new 88KV Power lines in order to remove the ESKOM power lines from the footprint of the Glencore mine. The project area is situated just south of Ogies in Mpumalanga Province of South Africa.

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A site visit was conducted on the 14th May 2015 to assess the area and any micro-habitats that would be an attractant for birds.

In total 15 Red List species were recorded in the broader area previously by the Southern African Bird Atlas Project 1 and 2 (Harrison *et al*, 1997; and www.sabap2.adu.org.za), comprising 1 Critically Endangered, 3 Endangered, 4 Vulnerable and 7 Near Threatened species (Taylor, 2014). There is also 1 Bonn listed species present in the broader study area.

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 (Ledger & Annegarn 1981; Ledger 1983; Ledger 1984; Hobbs & Ledger 1986a; Hobbs & Ledger 1986b; Ledger, Hobbs & Smith, 1992; Verdoorn 1996; Kruger & Van Rooyen 1998; Van Rooyen 1998; Kruger 1999; Van Rooyen 1999; Van Rooyen 2000). Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, (Van Rooyen & Taylor 1999) and disturbance and habitat destruction during construction and maintenance activities.

Electrocution of birds is caused when a bird bridges the gap between either a live phase and an earth component (phase-earth electrocution) or two live phases (phase-phase electrocutions). This type of impact is a function of line design and the dimensions of a birds extremities. On the other hand, power lines have proven to be partially beneficial to many birds, including species such as Martial Eagles *Polemaetus bellicosus*, Tawny Eagles *Aquila rapax*, African White-backed Vultures *Gyps africanus*, and even occasionally Verreaux's Eagles *Aquila verreauxii* by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce (van Rooyen 2004). Cape Vultures have also taken to roosting on power lines in certain areas in large numbers (van Rooyen 2004a), while Lappet-faced Vultures are known to use power lines as roosts, especially in areas where large trees are scarce (pers.obs.). Although this provision of nesting and roosting substrate can be beneficial, it could also simply place these birds at greater risk of collision with the power lines.

Collision of birds: Collisions are the biggest single threat posed by the larger overhead lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001). Data collected in the Northern Cape Province between 1997 and 1999 provides further evidence of the gravity of the problem. During an initial clearing of transects, a total of 194 large bird carcasses were found under 40km of Transmission line (220kV and 400kV) near De Aar in the Northern Cape. Subsequent monitoring of 140 km of power lines (transects of 10km each from 22kV up to 400kV) in the same area over a period of 12 months produced another 196 carcasses (mostly cranes and bustards).

The Red List bird species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the result that consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term. Many of the anthropogenic threats to these species are non-discriminatory as far as age is concerned (e.g. habitat destruction, disturbance and power lines) and therefore contribute to adult mortality, and it is not known what the cumulative effect of these impacts could be over the long term.

Habitat destruction: 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 levelling 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 minimize 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 of the servitude through modification of habitat.

Disturbance: Similarly, the above mentioned construction and maintenance activities impact on birds through disturbance, particularly during the birds' breeding activities.

Quality of supply of power lines by causing faults (short circuits): Birds are able to cause electrical faults on power lines through various mechanisms such as bird streamers, bird pollution and bird nesting. The more faults that occur on a line, the lower the quality of electrical supply to the end customers, which is not desirable from Eskom's perspective.

1.2 Terms of reference

The terms of reference used for this project were as follows:

WildSkies Ecological Services will provide an assessment of the potential impact associated with the proposed construction of two (2) 88 kV powerlines and dismantling of two (2) 88 kV powerlines from Grootpan to Brakfontein, south of Ogies in Mpumalanga Province on ecological resources. The study will further include a comparative assessment of the environmental impacts related to alternatives proposed by Eskom Distribution (Northern Region), and recommendations and mitigation measures to minimise identified impacts during all phases of the project life-cycle (planning, construction, operation and decommissioning).

1.3. Limitations

This study made the assumption that the sources of information discussed above are reliable, but the following factors may potentially detract from the accuracy of the predicted results. The Atlas of Southern African Birds (Harrison *et al.* 1997) data is quite old now (covering the period 1986-1997), and bird distribution patterns fluctuate continuously according to availability of food and nesting substrate, and environmental conditions. Various other inaccuracies could exist in this atlas data; for a full discussion of these see Harrison *et al.* (1997). The more recent second Southern African Bird Atlas Project (www.sabap2.adu.org.za) provides a more recent source of bird data, but has not covered all parts of the country sufficiently.

The EIA process for power lines of this type in South Africa relies heavily on existing information, and this avifaunal study is no different. Field work was conducted in order to examine specific areas and ground truth information, but by necessity much of the information used is obtained from various existing sources (see 1.4) in order to make an educated assessment. Invariably, the existing information on birds is obtained over a far longer period and far more representative conditions than the short term EIA study.

1.4. Sources of information

The following information sources were consulted:

- Bird distribution data from the South African Bird Atlas Projects 1 and 2 (SABAP 1 and SABAP 2) were obtained to ascertain which bird species occur in the study area (Harrison *et al.* 1997, SABAP 2 2013).
- The conservation status of all bird species occurring in the study area was determined using The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor, 2014) and the IUCN Red List for Birds (BirdLife International 2013).
- A description of the vegetation types occurring in the study area was obtained from The Vegetation of South Africa, Lesotho and Swaziland (Bredenkamp, G., Granger, J.E. & van Rooyen, N., 1996).

- The Important Bird Area programme of BirdLife South Africa was consulted (Barnes 1998, and recent updates of the Important Bird Areas Directory downloaded from http://www.birdlife.org.za; BirdLife South Africa 2013).
- Through a field investigation (conducted during May 2015), information at the micro-habitat level was obtained first hand by driving the proposed route, as close to the alignment as roads would allow, and examining sections of particular concern.
- The author has extensive field experience in the study area and significant expertise in the field of power line collisions affecting large South African birds.

1.5. Legislation and policy relevant to this assessment

The relevant legislation to this specialist field and development include the following:

- The Convention on Biological Diversity (CBD) is dedicated to promoting sustainable development. The Convention recognizes that biological diversity is about more than plants, animals and micro-organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. It is an international convention signed by 150 leaders at the Rio 1992 Earth Summit. South Africa is a signatory to this convention, and any development should consider its' principles.
- An important principle encompassed by the CBD is the precautionary principle which essentially states that where serious threats to the environment exist, lack of full scientific certainty should not be used as reason for delaying management of these risks. The burden of proof that the impact will *not* occur lies with the proponent of the activity posing the threat.
- The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 117 (as of 1 June 2012) Parties from Africa, Central and South America, Asia, Europe and Oceania. South Africa is a signatory to the CMS and several relevant bird species could occur on the proposed site.
- The African-Eurasian Water bird Agreement. The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is the largest of its kind developed so far under the CMS. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds and even the South African penguin. The agreement covers 119 countries and the European Union (EU) from Europe, parts

of Asia and Canada, the Middle East and Africa. Several of the bird species covered by the AEWA are relevant to the proposed project.

- National Environmental Management – Biodiversity Act - Threatened Or Protected Species list (TOPS).

2 METHODS

2.1. Locality

Figure 1 shows the position and layout of the proposed project.

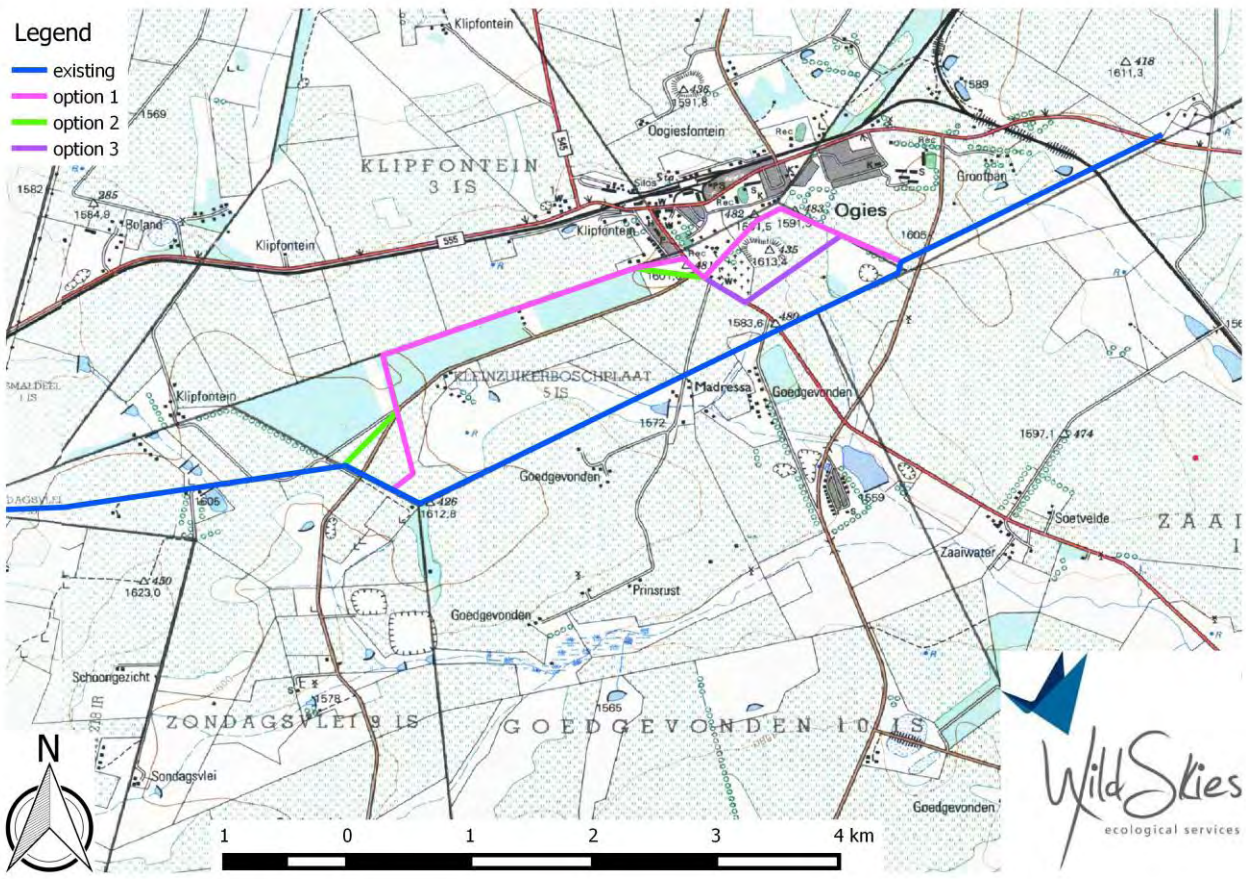


Figure 1- Map of the power line route alternatives with existing infrastructure (Map-Wildskies).

2.2. Bird Data- Southern African Bird Atlas Project Data

Table 1 lists the Red List bird species recorded by the SABAP1 and SABAP2 (Harrison *et al*, 1997, www.sabap2.adu.org.za) (the full species list is shown in Appendix 4). It is important to note that these species occur in the greater area and not necessarily specifically on this site.

In total 15 Red List species were recorded in the broader area previously by the Southern African Bird Atlas Project 1 and 2 (Harrison *et al*, 1997; and www.sabap2.adu.org.za), comprising 1 Critically Endangered, 3 Endangered, 4 Vulnerable and 7 Near Threatened species (Taylor, 2014). There is also 1 Bonn listed species present in the broader study area.

Using this data in combination with the assessment of the micro habitats available to birds in the area – an effective assessment of potential impacts of the proposed developments has been made as described below. As mentioned earlier in this study, in our opinion the likelihood of any of the Red List species occurring on site is low, as presented in Table 1.

Of importance to note is that the author consulted with the Endangered Wildlife Trust (EWT) regarding the presence of the African Grass Owl on or around this site. The African Grass Owl is listed as Vulnerable by Taylor (2014). As can be seen in the table below it is not recorded by SABAP 1 or 2. There is one record of occurrence reported by the EWT occurring 2 kilometres south east of Ogies town centre. Of importance this is within 1 kilometre of the proposed new line and within 600 metres of the existing line.

An interesting fact to note from the below data is that out of the 16 species detailed in Table 1 only 5 were recorded in the SABAP 2 data. One possible reason for this is that the area has become urbanised much more intensively since the SABAP 1 data was collected and the resulting habitat destruction and disturbance has resulted in far fewer Red List species than during the SABAP 1 data collection years. Another explanation is that this area may not have been very well surveyed during SABAP 2.

Table 1. Red List bird species recorded in the greater study area (within which the proposed power lines are located) Harrison *et al*, 1997.

Common name	Taxonomic Name	SABAP 1	SABAP 2	Regional Red List Status 2014	Habitat	Probability of occurrence on site
Crane, Wattled	*Bugeranus carunculatus*	X		CR	Grassland with a small core of essential wetland breeding habitat	Unlikely
Marsh-Harrier, African	*Circus ranivorus*	X	X	EN	Breeds in wetlands, foraging primarily over reeds and lake margins	Unlikely
Stork, Yellow-billed	*Mycteria ibis*	X		EN	Variety of wetlands	Unlikely
Lark, Botha's	*Spizocorys fringillaris*	X		EN	Well-grazed upland grasslands	Possible
Stork, Black	*Ciconia nigra*	X		VU	Old, undisturbed, open forests	Unlikely
Korhaan, White-bellied	*Eupodotis senegalensis*	X		VU	Taller grass	Possible
Ibis, Southern Bald	*Geronticus calvus*		X	VU	High rainfall sour and alpine grasslands	Unlikely
Secretarybird	*Sagittarius serpentarius*	X		VU	Grasslands, ranging from open plains to lightly wooded savanna	Possible
Crane, Blue	*Anthropoides paradiseus*	X		NT	Open grassland, dwarf shrubland and cultivated land	Unlikely
Stork, Abdim's	*Ciconia abdimii*	X		NT	Open grassland, pastures, areas of cultivation	Possible
Roller, European	*Coracias garrulus*	X		NT	Lowland open countryside	Possible
Pratincole, Black-winged	*Glareola nordmanni*	X		NT	Open high-altitude glassland and mudflats	Unlikely
Duck, Maccoa	*Oxyura maccoa*	X	X	NT	Larger, deeper lakes and brackish lagoons	Unlikely
Flamingo, Lesser	*Phoenicopterus minor*	X		NT	Large undisturbed alkaline and saline lakes, salt pans	Unlikely
Flamingo, Greater	*Phoenicopterus ruber*	X	X	NT	Shallow eutrophic waterbodies	Unlikely
Stork, White	*Ciconia ciconia*	X	X	Bonn	Open areas	Probable

CR= Critically Endangered; EN= Endangered**;** VU=Vulnerable; NT=Near-threatened; Bonn=Protected Internationally under the Bonn Convention on Migratory Species.

2.3. Land use and vegetation

The route was plotted on Google Earth to show the surrounding land use in the area and hence the habitat available to birds (see Figure 2).

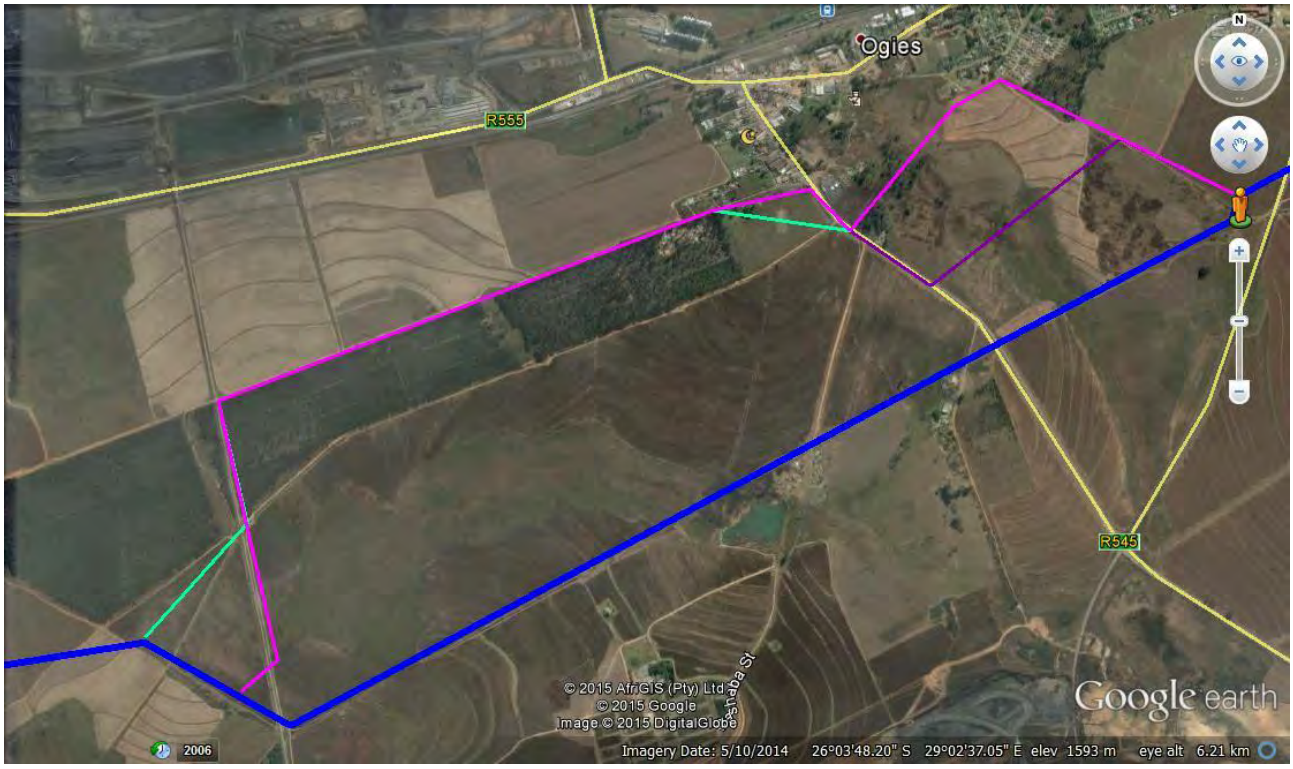


Figure 2- Map of the power line route alternatives showing the human land use in the area. (Map-Wildskies).

As can be seen on the above map the area is essentially agricultural land. During the site visit this was observed and there was a mix of agricultural activities and fallow land. There were also sections being used for informal housing closer to Ogies town centre.

The vegetation of the area is classified as Grassland (Bredenkamp & van Rooyen 1996) and is described as follows: "The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZuluNatal and the Eastern Cape. The topography is mainly flat and rolling, but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands (also known locally as Grassveld) are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees." (Bredenkamp & Van Rooyen 1996).

2.4. Micro-Habitats

In terms of micro-habitats available for birds on site, the agricultural fields and Eucalyptus plantations are the only attractive micro-habitat, and will attract primarily non-Red List species. The extent to which Red List species will frequent this area is relatively unknown, but in our opinion the likelihood of either large numbers or frequent visits to the site by Red List species is low.

The site was visited to assess the route. Pictures of the study area can be seen below in Figures 3-8.

Figure 3- Typical Agricultural fields in the study site

Figure 4- Burnt grassland in the study area

Figure 5- Fallow maize fields in the study area

Figure 6- Blue Gum Plantation bordering agricultural land in study area

Figure 7- Vacant servitude in the study area

Figure 8- Grassland in the study area

3 IMPACT ASSESSMENT

The results of the study have been assessed and quantified in Appendix 2 against a set of criteria in Appendix 3. The results are discussed further below.

3.1. Collisions

Collisions have been rated as medium significance pre-mitigation and low significance post-mitigation. The short distance of the new lines as well as the receiving environment have resulted in this significance rating. It is however still recommended that anti-collision marking devices be installed during construction. This is in line with the precautionary principle and the fact that these marking devices are much cheaper to install during construction.

The fact that some collision sensitive species have been recorded in the area in the past has resulted in this cautious approach. These species include the cranes, storks, and flamingos.

Areas that require anti-collision marking devices are shown below in the google earth image. These can be refined further during an avifaunal walk down, discussed in more detail below.

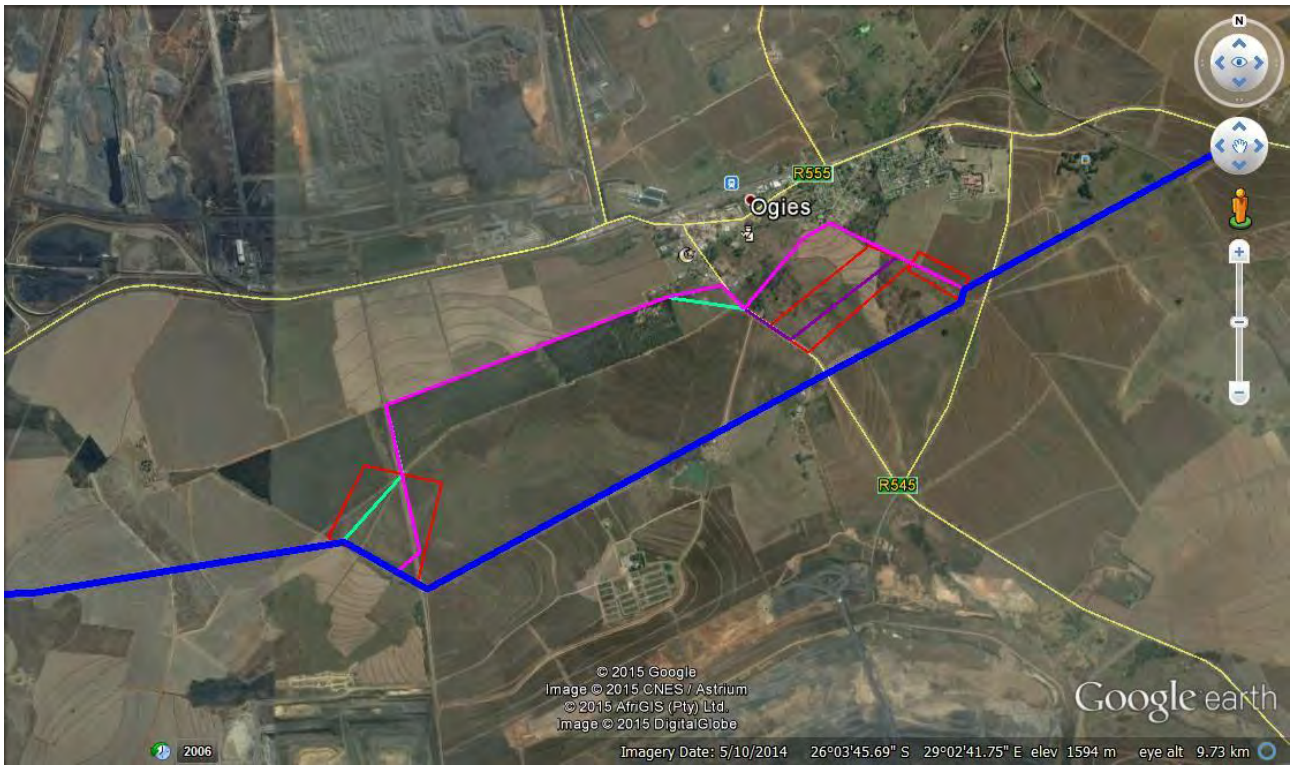


Figure 9- Areas requiring marking with anti-collision marking devices (Red Blocks).

3.2. Habitat Destruction

Habitat destruction has been rated as medium significance pre-mitigation and low significance post-mitigation. As mentioned in the appendix below the main aspect to mitigate the impact of habitat destruction is the establishment of an Environmental Management Plan (EMP) and the monitoring of this EMP by an onsite ECO during construction and removal of the existing line.

Should any birds nests be found on the existing line an avifaunal specialists must be consulted to determine the significance of this impact prior to removal.

It must also be noted that the minimal amount of Eucalyptus trees must be removed as these are used by birds for nesting and roosting. It is recommended that the new power line be constructed in the agricultural field bordering the eucalyptus trees to avoid having to disturb any avifauna using these trees. The trees and agricultural field can be seen in figure 6 above.

One important species to consider is the African Grass Owl. As reported above the African Grass Owl was recorded by the EWT in the following location:

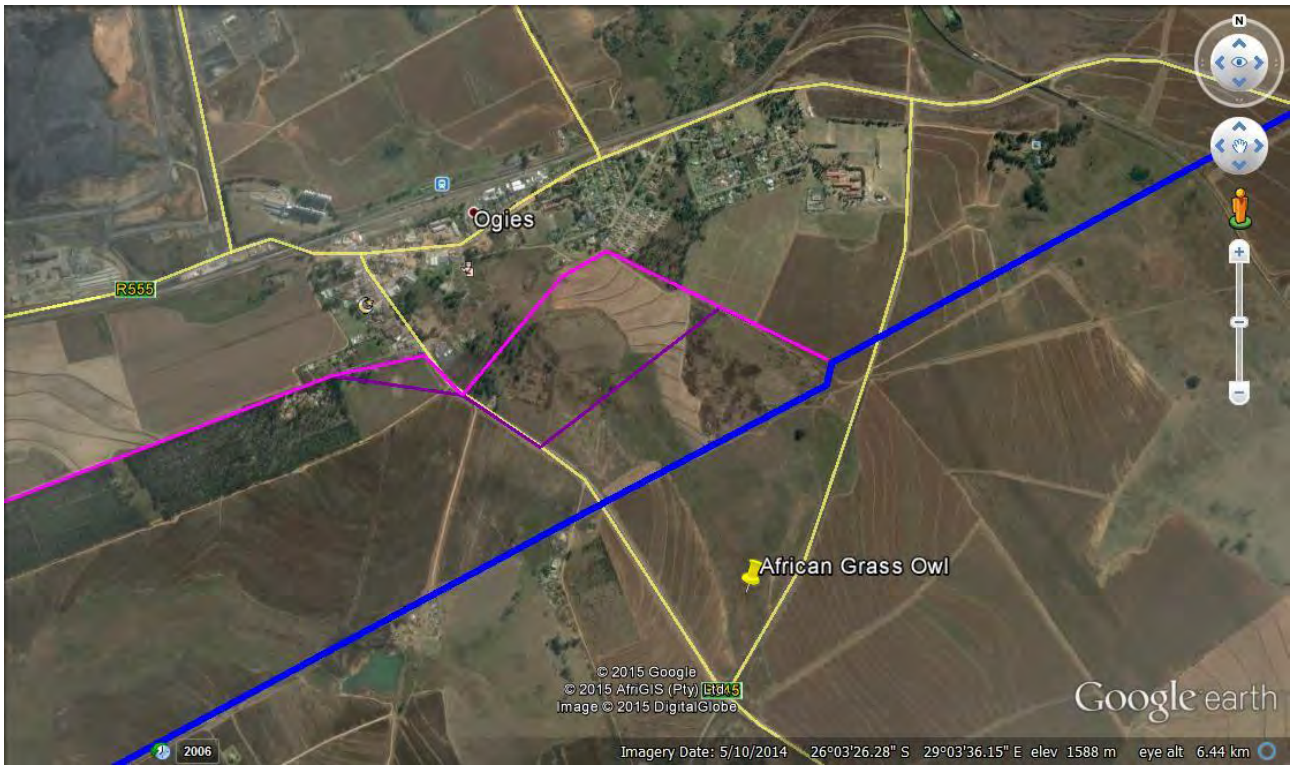


Figure 10- Location of African Grass Owl as recorded by EWT.

The presence of this species means that further fieldwork must be conducted once Eskom have finalised the layout and prior to any work commencing. The aim of this field work will be to walk the existing power line

route in search of African Grass Owls, and especially nesting sites. The new sections of line should also be walked once they have been surveyed. This will take the form of a site specific EMP. During this avifaunal walk down the specific sections of line requiring anti-collision bird marking will also be identified.

3.3. Electrocutions

Electrocutions have been rated as medium significance pre-mitigation and low significance post-mitigation. The mitigation measure for electrocutions is primarily related to selection of an avifaunal friendly power line pole design. Eskom have indicated they will use the steel monopole as per Appendix 1. If this is the case then the impact on avifaunal will be very low as this is a very safe design for birds.

3.4. Disturbance

Disturbance has been rated as low significance both pre and post mitigation. The mitigation for disturbance is very similar to that of habitat destruction and as such is not discussed further.

The one exception to this is should African Grass Owl be found on site and in particular should nesting sites be found during the site specific EMP the impact of disturbance would increase dramatically. This would be especially true should work commence during the breeding season (this should end around the middle of June).

3.5 Quality of electrical supply

This impact has been rated as medium significance pre-mitigation and low significance post-mitigation. The mitigation measure for quality of supply is primarily related to selection of the power line pole design. Eskom have indicated they will use the steel monopole as per Appendix 1. If this is the case then the impact will be very unlikely as this design is generally immune from the impact of bird induced faulting.

3.6. Assessment of alternatives

3.6.1. Power Line

There are three alternatives for the routing of the new lines. These all essentially follow the same routing with a few differences. None of the three are fatally flawed from an avifaunal perspective and they could all be used. There is a slight preference for option 1 as it follows more existing roads and will result in lower habitat destruction and disturbance.

4 CONCLUSION AND IMPACT STATEMENT

It is concluded that the proposed project can proceed with minimal impact on avifauna. The main findings of this report include the fact that certain areas will require marking with anti-collision marking devices. This is due to the historical presence of some collision sensitive species in the area. Furthermore the steel monopole design must be used to mitigate against electrocutions. Standard EMP principles must be followed to mitigate for the impact of habitat destruction and disturbance on avifauna and should this be done the project may proceed with minimal impact on avifauna.

A site specific EMP is required to search for nesting sites and the general presence of African Grass Owl in the area. Once Eskom have decided on the preferred alternative this must be walked along with the existing power line that is to be dismantled. Should African Grass Owl be found during this walk down suitable recommendations will be given in a report following this phase of the project. During this avifaunal walk down the specific sections of line requiring marking with anti-collision marking devices will be further refined.

There is a slight preference for option 1 when it comes to the routing alternatives but all three alternatives are possible from an avifaunal perspective.

If at all possible the large stands of eucalyptus trees should be kept in position and not impacted upon during construction. This is to mitigate for any birds nesting or roosting within these trees.

5 REFERENCES

Anderson, M.D. 2001. The effectiveness of two different marking devices to reduce large terrestrial bird collisions with overhead electricity cables in the eastern Karoo, South Africa. Draft report to Eskom Resources and Strategy Division. Johannesburg. South Africa.

Anonymous. 2007. Google Earth. http://www.googleearth.com. Viewed May 2009.

Barnes, K.N. (ed.) 1998. The Important Bird Areas of southern Africa. Birdlife South Africa: Johannesburg.

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.

Hobbs, J.C.A. & Ledger J.A. 1986a. The Environmental Impact of Linear Developments; Power lines and Avifauna. (Third International Conference on Environmental Quality and Ecosystem Stability. Israel, June 1986).

Hobbs, J.C.A. & Ledger J.A. 1986b. "Power lines, Birdlife and the Golden Mean." Fauna and Flora, 44, pp 23-27.

Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (Eds) 2005. Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Kruger, R. & Van Rooyen, C.S. 1998. Evaluating the risk that existing power lines pose to large raptors by using risk assessment methodology: the Molopo Case Study. (5th World Conference on Birds of Prey and Owls: 4 - 8 August 1998. Midrand, South Africa.)

Kruger, R. 1999. Towards solving raptor electrocutions on Eskom Distribution Structures in South Africa. M. Phil. Mini-thesis. University of the Orange Free State. Bloemfontein. South Africa.

Ledger, J. 1983. Guidelines for Dealing with Bird Problems of Transmission Lines and Towers. Eskom Test and Research Division Technical Note TRR/N83/005.

Ledger, J.A. & Annegarn H.J. 1981. "Electrocution Hazards to the Cape Vulture (Gyps coprotheres) in South Africa". Biological Conservation, 20, pp15-24.
Ledger, J.A. 1984. "Engineering Solutions to the problem of Vulture Electrocutions on Electricity Towers." The Certificated Engineer, 57, pp 92-95.

Ledger, J.A., J.C.A. Hobbs & Smith T.V. 1992. Avian Interactions with Utility Structures: Southern African Experiences. (Proceedings of the International Workshop on Avian Interactions with Utility Structures, Miami, Florida, 13-15 September 1992. Electric Power Research Institute.)

Van Rooyen, C.S. 1998. Raptor mortality on power lines in South Africa. (5th World Conference on Birds of Prey and Owls: 4 - 8 August 1998. Midrand, South Africa.)

Van Rooyen, C.S. 1999**.** An overview of the Eskom - WILDSKIES ECOLOGICAL SERVICES Strategic Partnership in South Africa. (EPRI Workshop on Avian Interactions with Utility Structures 2-3 December 1999, Charleston, South Carolina.)

Van Rooyen, C.S. 2000. "An overview of Vulture Electrocutions in South Africa." Vulture News, 43, pp 5-22. Vulture Study Group: Johannesburg, South Africa.

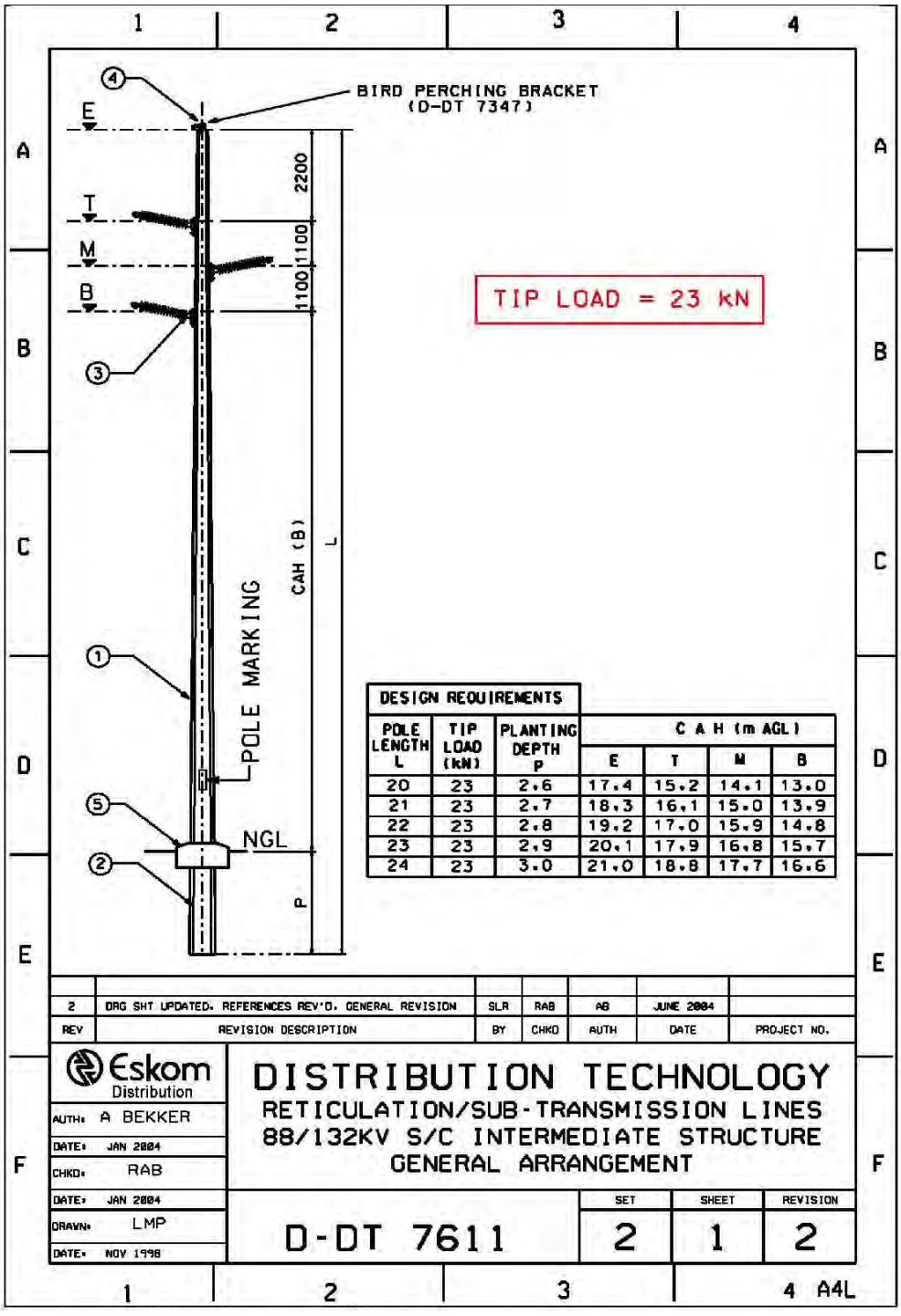
Van Rooyen, C.S. 2004a. The Management of Wildlife Interactions with overhead lines. In The fundamentals and practice of Overhead Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

Van Rooyen, C.S. 2004b. Investigations into vulture electrocutions on the Edwardsdam-Mareetsane 88kV feeder, Unpublished report, Endangered Wildlife Trust, Johannesburg.

Van Rooyen, C.S. & Taylor, P.V. 1999. Bird Streamers as probable cause of electrocutions in South Africa. (EPRI Workshop on Avian Interactions with Utility Structures 2-3 December 1999. Charleston, South Carolina)

Verdoorn, G.H. 1996. Mortality of Cape Griffons Gyps coprotheres and African White-backed Vultures Pseudogyps africanus on 88kV and 132kV power lines in Western Transvaal, South Africa, and mitigation measures to prevent future problems. (2nd International Conference on Raptors: 2-5 October 1996. Urbino, Italy.)

APPENDIX 1-STRUCTURE OF THE PROPOSED POLE DESIGN – THE STEEL MONOPOLE



APPENDIX 2- TABLE OF IMPACTS

Table 1- Impact table for Collision of birds with overhead power line.

Nature: **Collision of birds with overhead cables**		
	Without Mitigation	With Mitigation
Extent	Site (1)	Site (1)
Duration	Long Term (3)	Long Term (3)
Intensity	Moderate (2)	Low (1)
Probability	Possible (2)	Improbable (1)
Cumulative	Low	Low
Significance	**8 (Medium)**	**6 (Low)**
Status	**Negative**	**Negative**
Mitigation: Mitigation for collisions involves routing the line correctly as well as installing anti-collision marking devices to the line where necessary. Areas that require anti-collision marking devices have been discussed above and mapped accordingly. These areas must be further refined during an avifaunal walk down. These have been recommended following the precautionary principle and the fact these devices are far cheaper and easier to install during construction than afterwards should it become necessary.		

Table 2- Impact of habitat destruction on birds in the study area.

Nature: **Habitat destruction**		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Short Term (1)	Short Term (1)
Intensity	Moderate (2)	Low (1)
Probability	Highly Probable (3)	Possible (2)
Cumulative	Low	Low
Significance	**8 (Medium)**	**6 (Low)**
Status	**Negative**	**Negative**
Mitigation: Mitigation for habitat destruction includes the establishment and monitoring of an Environmental Management Plan (EMP) by an onsite ECO during construction. Care should be taken after the completion of construction during onsite maintenance activities. Of importance to note is that should any nests be found on the line that is to be removed a qualified avifaunal specialists must be consulted to determine the significance of this. Of critical importance will be the avifaunal walk down to determine if there are any African Grass Owls on the site. Recommendations on dealing with the African Grass Owl will be given following this phase of the project.		

Table 3- Impact of Electrocutions on birds on the new power line poles.

Nature: **Electrocutions on the new power line structures**		
	Without Mitigation	With Mitigation
Extent	Site (1)	Site (1)
Duration	Long Term (3)	Long Term (3)
Intensity	Moderate (2)	Low (1)
Probability	Possible (2)	Improbable (1)
Cumulative	Low	Low
Significance	**8 (Medium)**	**6 (Low)**
Status	**Negative**	**Negative**
Mitigation: Mitigation for electrocutions is dependent on the power line pole design. Eskom have indicated they will use the Steel Monopole design as per Appendix 1. If this does happen and the dimensions of the pole are as per the attachment then the impact of electrocutions will be very low as this is a generally safe structure for avifauna. If this design changes, a suitably qualified avifaunal specialist must be contacted to re-evaluate this impact.		

Table 4-Impact of Disturbance on birds in the study area.

Nature: **Disturbance of birds during construction and maintenance**		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Short Term (1)	Short Term (1)
Intensity	Moderate (2)	Low (1)
Probability	Possible (2)	Improbable (1)
Cumulative	Low	Low
Significance	**7 (low)**	**5 (low)**
Status	**Negative**	**Negative**
Mitigation: Mitigation for disturbance includes the establishment and monitoring of an Environmental Management Plan (EMP) by an onsite ECO during construction. Care should be taken after the completion of construction during onsite maintenance activities. Of importance to note is that should any nests be found on the line that is to be removed a qualified avifaunal specialists must be consulted to determine the significance of this. Of critical importance will be the avifaunal walk down to determine if there are any African Grass Owls on the site. Recommendations on dealing with the African Grass Owl will be given following this phase of the project.		

Table 5- Impact of birds on quality of electrical supply.

Nature: **Impact of birds on the quality of supply**		
	Without Mitigation	With Mitigation
Extent	Site (1)	Site (1)
Duration	Long Term (3)	Long Term (3)
Intensity	Moderate (2)	Low (1)
Probability	Possible (2)	Improbable (1)
Cumulative	Low	Low
Significance	**8 (Medium)**	**6 (Low)**
Status	**Negative for business**	**Negative for business**
Mitigation: Mitigation is dependent on the power line pole design. Eskom have indicated they will use the Steel Monopole design as per Appendix 1. If this is the case the impact of birds on the quality of supply will be very unlikely as this design is generally immune from this impact.		

APPENDIX 3- CRITERIA FOR EVALUATION OF IMPACTS

The following parameters are used to describe the impact/issues in this assessment:

1. Nature

A brief written statement of the environmental aspect being impacted upon by a particular action or activity.

2. Extent

The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site (1) – Within the construction site.
- Local (2) – Within a radius of 2 km of the construction site.
- Regional (3) – the scale applies to impacts on a provincial level and parts of neighbouring provinces.
- National (4) – the scale applies to impacts that will affect the whole South Africa.

3. Duration

Indicates what the lifetime of the impact will be.

- Short-term (1) – less than 5 years.
- Medium-term (2) – between 5 and 15 years.
- Long-term (3) – between 15 and 30 years.
- Permanent (4) – over 30 years and resulting in a permanent and lasting change that will always be there.

4. Intensity

Describes whether an impact is destructive or benign.

- Very High (4) - Natural, cultural and social functions and processes are altered to extent that they permanently cease.
- High (3) - Natural, cultural and social functions and processes are altered to extent that they temporarily cease.
- Moderate (2) - Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.
- Low (1) - Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.

5. Probability

Describes the likelihood of an impact actually occurring.

- Improbable (1) - Likelihood of the impact materialising is very low.
- Possible (2) - The impact may occur.
- Highly Probable (3) - Most likely that the impact will occur.
- Definite (4) - Impact will certainly occur.

6. Cumulative

In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

7. Significance

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Low impact

(4 - 6 points)

A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.

Medium impact

(7 - 9 points)

Mitigation is possible with additional design and construction inputs.

High impact

(10 - 12 points)

The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.

Very High impact

(13 - 16 points)

Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.

Status Denotes the perceived effect of the impact on the affected area.

Positive (+) Beneficial impact.
Negative (-) Deleterious or adverse impact.
Neutral (/) Impact is neither beneficial nor adverse.

APPENDIX 4- FULL BIRD LIST FOR THE STUDY SITE – SABAP1 & 2

Common name	Taxonomic name	SABAP 1	SABAP 2
Apalis, Bar-throated	Apalis thoracica	X	
Avocet, Pied	Recurvirostra avosetta	X	
Barbet, Black-collared	Lybius torquatus	X	X
Barbet, Crested	Trachyphonus vaillantii	X	X
Bee-eater, European	Merops apiaster	X	
Bishop, Southern Red	Euplectes orix	X	X
Bishop, Yellow	Euplectes capensis	X	
Bishop, Yellow-crowned	Euplectes afer	X	X
Bokmakierie, Bokmakierie	Telophorus zeylonus	X	X
Bulbul, Dark-capped	Pycnonotus tricolor	X	X
Bunting, Cinnamon-breasted	Emberiza tahapisi	X	
Buzzard, Jackal	Buteo rufofuscus	X	
Buzzard, Steppe	Buteo vulpinus	X	X
Canary, Black-throated	Crithagra atrogularis	X	X
Canary, Cape	Serinus canicollis	X	
Canary, Yellow	Crithagra flaviventris	X	X
Canary, Yellow-fronted	Crithagra mozambicus	X	
Chat, Anteating	Myrmecocichla formicivora	X	X
Chat, Familiar	Cercomela familiaris	X	
Cisticola, Cloud	Cisticola textrix	X	X
Cisticola, Desert	Cisticola aridulus	X	
Cisticola, Levaillant's	Cisticola tinniens	X	X
Cisticola, Wing-snapping	Cisticola ayresii	X	X
Cisticola, Zitting	Cisticola juncidis	X	X
Cliff-Swallow, South African	Hirundo spilodera	X	X
Coot, Red-knobbed	Fulica cristata	X	X
Cormorant, Reed	Phalacrocorax africanus	X	X
Cormorant, White-breasted	Phalacrocorax carbo	X	X
Coucal, Burchell's	Centropus burchellii	X	
Coucal, Burchells	Centropus burchelli	X	
Coucal, White-browed	Centropus superciliosus	X	
Crake, Black	Amaurornis flavirostris	X	X
Crane, Blue	Anthropoides paradiseus	X	
Crane, Wattled	Bugeranus carunculatus	X	
Crow, Cape	Corvus capensis	X	
Crow, Pied	Corvus albus	X	X
Cuckoo, Diderick	Chrysococcyx caprius	X	X
Cuckoo, Klaas's	Chrysococcyx klaas	X	
Cuckoo, Red-chested	Cuculus solitarius	X	

Darter, African	Anhinga rufa	X	X
Dove, Laughing	Streptopelia senegalensis	X	X
Dove, Namaqua	Oena capensis	X	X
Dove, Red-eyed	Streptopelia semitorquata	X	X
Dove, Rock	Columba livia	X	X
Duck, Comb	Sarkidiornis melanotos	X	
Duck, Fulvous	Dendrocygna bicolor	X	X
Duck, Maccoa	Oxyura maccoa	X	X
Duck, White-backed	Thalassornis leuconotus	X	
Duck, White-faced	Dendrocygna viduata	X	X
Duck, Yellow-billed	Anas undulata	X	X
Egret, Cattle	Bubulcus ibis	X	X
Egret, Great	Egretta alba	X	X
Egret, Little	Egretta garzetta	X	X
Egret, Yellow-billed	Egretta intermedia	X	X
Falcon, Amur	Falco amurensis	X	X
Finch, Red-headed	Amadina erythrocephala	X	X
Fiscal, Common (Southern)	Lanius collaris	X	X
Flamingo, Greater	Phoenicopterus ruber	X	X
Flamingo, Lesser	Phoenicopterus minor	X	
Flufftail, Red-chested	Sarothrura rufa	X	
Flycatcher, Fiscal	Sigelus silens		X
Flycatcher, Spotted	Muscicapa striata		X
Goose, Egyptian	Alopochen aegyptiacus	X	X
Goose, Spur-winged	Plectropterus gambensis	X	X
Grebe, Black-necked	Podiceps nigricollis	X	
Grebe, Great Crested	Podiceps cristatus	X	X
Grebe, Little	Tachybaptus ruficollis	X	X
Greenshank, Common	Tringa nebularia	X	
Guineafowl, Helmeted	Numida meleagris	X	X
Gull, Grey-headed	Larus cirrocephalus	X	X
Hamerkop, Hamerkop	Scopus umbretta	X	X
Harrier, Montagu's	Circus pygargus	X	
Harrier-Hawk, African	Polyboroides typus		X
Heron, Black	Egretta ardesiaca	X	
Heron, Black-headed	Ardea melanocephala	X	X
Heron, Goliath	Ardea goliath	X	
Heron, Green-backed	Butorides striata	X	
Heron, Grey	Ardea cinerea	X	X
Heron, Purple	Ardea purpurea	X	X
Heron, Squacco	Ardeola ralloides	X	X
Hoopoe, African	Upupa africana	X	

House-Martin, Common	Delichon urbicum	X	X
Ibis, African Sacred	Threskiornis aethiopicus	X	X
Ibis, Glossy	Plegadis falcinellus	X	X
Ibis, Hadeda	Bostrychia hagedash	X	X
Ibis, Southern Bald	Geronticus calvus		X
Jacana, African	Actophilornis africanus	X	
Kestrel, Greater	Falco rupicoloides	X	
Kestrel, Lesser	Falco naumanni	X	
Kestrel, Rock	Falco rupicolus	X	
Kingfisher, Malachite	Alcedo cristata	X	X
Kingfisher, Pied	Ceryle rudis	X	X
Kite, Black-shouldered	Elanus caeruleus	X	X
Kite, Yellow-billed	Milvus aegyptius	X	
Korhaan, Black	Eupodotis afra	X	
Korhaan, Northern Black	Afrotis afraoides		X
Korhaan, White-bellied	Eupodotis senegalensis	X	
Lapwing, African Wattled	Vanellus senegallus	X	X
Lapwing, Blacksmith	Vanellus armatus	X	X
Lapwing, Crowned	Vanellus coronatus	X	X
Lark, Agulhas Clapper	Mirafra marjoriae	X	
Lark, Botha's	Spizocorys fringillaris	X	
Lark, Cape Clapper	Mirafra apiata	X	
Lark, Clapper	Mirafra apiata	X	
Lark, Eastern Clapper	Mirafra fasciolata	X	
Lark, Eastern Long-billed	Certhilauda semitorquata		X
Lark, Pink-billed	Spizocorys conirostris	X	
Lark, Red-capped	Calandrella cinerea	X	X
Lark, Rufous-naped	Mirafra africana	X	X
Lark, Spike-heeled	Chersomanes albofasciata	X	
Longclaw, Cape	Macronyx capensis	X	X
Marsh-Harrier, African	Circus ranivorus	X	X
Martin, Banded	Riparia cincta	X	X
Martin, Brown-throated	Riparia paludicola	X	X
Martin, Rock	Hirundo fuligula	X	X
Martin, Sand	Riparia riparia	X	X
Masked-Weaver, Southern	Ploceus velatus	X	X
Moorhen, Common	Gallinula chloropus	X	X
Mousebird, Red-faced	Urocolius indicus	X	
Mousebird, Speckled	Colius striatus	X	X
Myna, Common	Acridotheres tristis	X	X
Neddicky, Neddicky	Cisticola fulvicapilla	X	X
Night-Heron, Black-crowned	Nycticorax nycticorax	X	X

Ostrich, Common	Struthio camelus		X
Owl, Barn	Tyto alba	X	
Owl, Marsh	Asio capensis	X	X
Palm-Swift, African	Cypsiurus parvus	X	
Pigeon, Speckled	Columba guinea	X	X
Pipit, African	Anthus cinnamomeus	X	X
Pipit, Long-billed	Anthus similis	X	X
Pipit, Plain-backed	Anthus leucophrys	X	
Plover, Kittlitz's	Charadrius pecuarius	X	X
Plover, Three-banded	Charadrius tricollaris	X	X
Pochard, Southern	Netta erythrophthalma	X	X
Pratincole, Black-winged	Glareola nordmanni	X	
Prinia, Black-chested	Prinia flavicans	X	X
Prinia, Tawny-flanked	Prinia subflava	X	
Quail, Common	Coturnix coturnix	X	X
Quail, Harlequin	Coturnix delegorguei	X	
Quailfinch, African	Ortygospiza atricollis	X	X
Quelea, Red-billed	Quelea quelea	X	X
Rail, African	Rallus caerulescens	X	
Reed-Warbler, African	Acrocephalus baeticatus		X
Robin-Chat, Cape	Cossypha caffra	X	X
Roller, European	Coracias garrulus	X	
Ruff, Ruff	Philomachus pugnax	X	X
Rush-Warbler, Little	Bradypterus baboecala	X	
Sandpiper, Common	Actitis hypoleucos	X	
Sandpiper, Curlew	Calidris ferruginea	X	
Sandpiper, Marsh	Tringa stagnatilis	X	
Sandpiper, Wood	Tringa glareola	X	
Secretarybird, Secretarybird	Sagittarius serpentarius	X	
Shelduck, South African	Tadorna cana	X	
Shoveler, Cape	Anas smithii	X	X
Shrike, Red-backed	Lanius collurio	X	
Snipe, African	Gallinago nigripennis	X	X
Sparrow, Cape	Passer melanurus	X	X
Sparrow, Greyheaded	Passer diffusus	X	
Sparrow, House	Passer domesticus	X	X
Sparrow, Northern Grey-headed	Passer griseus	X	
Sparrow, Southern Grey-headed	Passer diffusus	X	X
Sparrowlark, Chestnut-backed	Eremopterix leucotis	X	
Spoonbill, African	Platalea alba	X	X
Spurfowl, Swainson's	Pternistis swainsonii	X	X
Starling, Cape Glossy	Lamprotornis nitens	X	X

Starling, Pied	Spreo bicolor	X	X
Starling, Red-winged	Onychognathus morio	X	
Starling, Wattled	Creatophora cinerea		X
Stilt, Black-winged	Himantopus himantopus	X	X
Stint, Little	Calidris minuta	X	X
Stonechat, African	Saxicola torquatus	X	X
Stork, Abdim's	Ciconia abdimii	X	
Stork, Black	Ciconia nigra	X	
Stork, White	Ciconia ciconia	X	X
Stork, Yellow-billed	Mycteria ibis	X	
Sunbird, Amethyst	Chalcomitra amethystina	X	
Swallow, Barn	Hirundo rustica	X	X
Swallow, Greater Striped	Hirundo cucullata	X	X
Swallow, Lesser Striped	Hirundo abyssinica	X	X
Swallow, Red-breasted	Hirundo semirufa	X	
Swallow, White-throated	Hirundo albigularis	X	X
Swamp-Warbler, Lesser	Acrocephalus gracilirostris	X	X
Swamphen, African Purple	Porphyrio madagascariensis	X	
Swift, African Black	Apus barbatus		X
Swift, Common	Apus apus	X	
Swift, Horus	Apus horus	X	X
Swift, Little	Apus affinis	X	X
Swift, White-rumped	Apus caffer	X	X
Teal, Cape	Anas capensis	X	X
Teal, Hottentot	Anas hottentota	X	
Teal, Red-billed	Anas erythrorhyncha	X	X
Tern, Whiskered	Chlidonias hybrida	X	X
Tern, White-winged	Chlidonias leucopterus	X	
Thick-knee, Spotted	Burhinus capensis	X	X
Thrush, Groundscraper	Psophocichla litsipsirupa		X
Thrush, Karoo	Turdus smithi	X	X
Thrush, Olive	Turdus olivaceus	X	
Thrush, Olive	Turdus olivaceus	X	
Turtle-Dove, Cape	Streptopelia capicola	X	X
Wagtail, Cape	Motacilla capensis	X	X
Warbler, Sedge	Acrocephalus schoenobaenus	X	
Warbler, Willow	Phylloscopus trochilus	X	X
Waxbill, Common	Estrilda astrild	X	X
Waxbill, Orange-breasted	Amandava subflava	X	X
Weaver, Cape	Ploceus capensis	X	
Weaver, Village	Ploceus cucullatus		X
Wheatear, Capped	Oenanthe pileata	X	X

Wheatear, Mountain	Oenanthe monticola	X	
White-eye, Cape	Zosterops pallidus	X	
White-eye, Cape	Zosterops virens	X	
White-eye, Orange River	Zosterops pallidus	X	
Whydah, Pin-tailed	Vidua macroura	X	X
Widowbird, Fan-tailed	Euplectes axillaris	X	X
Widowbird, Long-tailed	Euplectes progne	X	X
Widowbird, Red-collared	Euplectes ardens	X	X
Widowbird, White-winged	Euplectes albonotatus	X	X
Wood-Hoopoe, Green	Phoeniculus purpureus	X	X
Woodpecker, Cardinal	Dendropicos fuscescens		X
Wryneck, Red-throated	Jynx ruficollis	X	X

APPENDIX D2

ECOLOGICAL ASSESSMENT

SPECIALIST ECOLOGICAL HABITAT ASSESSMENT FOR THE PROPOSED GROOTPAN–BRAKFONTEIN 88kV LINE, ESKOM DISTRIBUTION DIVISION, NORTHERN REGION; MPUMALANGA PROVINCE

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1. BACKGROUND INFORMATION

Eskom Transmission is responsible for providing a high quality supply of electricity to meet the ever increasing needs of its end users. As a result, its infrastructure of powerlines and substations are continuingly being established and expanded upon to support annual load growth. The existing Grootpan-Brakfontein powerlines are located on a mining property immediately to the south of Ogies within southern Mpumalanga (see Figure 1: Locality Map). The mine has requested ~~that~~ Eskom to relocate~~remove~~ the lines as they are within the operational footprint of the mine. The project therefore involves the removal of the existing powerlines and re-routing of two new 7km 88kV powerlines with a 2km servitude corridor from the Grootpan satellite substation to Brakfontein substation near Ogies in Mpumalanga. These lines ensure continuity of supply and access to electricity for the surrounding communities.

Eskom Holdings SoC Limited has, in line with the EIA Regulations, appointed Royal HaskoningDHV as the independent consultant to undertake the Basic Assessment for the removal of the existing powerlines and re-routing of two new 7km 88kV powerlines with a 2km servitude corridor from Grootpan to Brakfontein near Ogies in Mpumalanga Province. Royal HaskoningDHV has appointed Mr C.L. Cook to undertake an ecological habitat assessment as well as faunal habitat assessment to investigate the potential animal (mammals, reptiles and amphibians) related impacts associated with the removal of the existing lines and the two new 7km 88kV powerlines with a 2km servitude corridor from Grootpan to Brakfontein near Ogies in Mpumalanga (henceforth called the Grootpan-Brakfontein project). It must be stressed that due to time as well as financial constraints no comprehensive vegetation or faunal survey were conducted but merely a brief assessment of the current ecological status of the current Grootpan-Brakfontein lines and the two new 7km 88kV powerline alignments.

By surveying the current alignments as well as the proposed new alignments as well as immediate habitats adjacent to the proposed alignments for specialised habitats, as well as the remaining vegetation and specific habitats, one can make an assumption of the possible presence or absence of threatened plant and animal species. The survey was supplemented by literature investigations; personal records, historic data and previous surveys conducted in the Ogies, Bethal-Trichardt areas as well as in similar habitats.

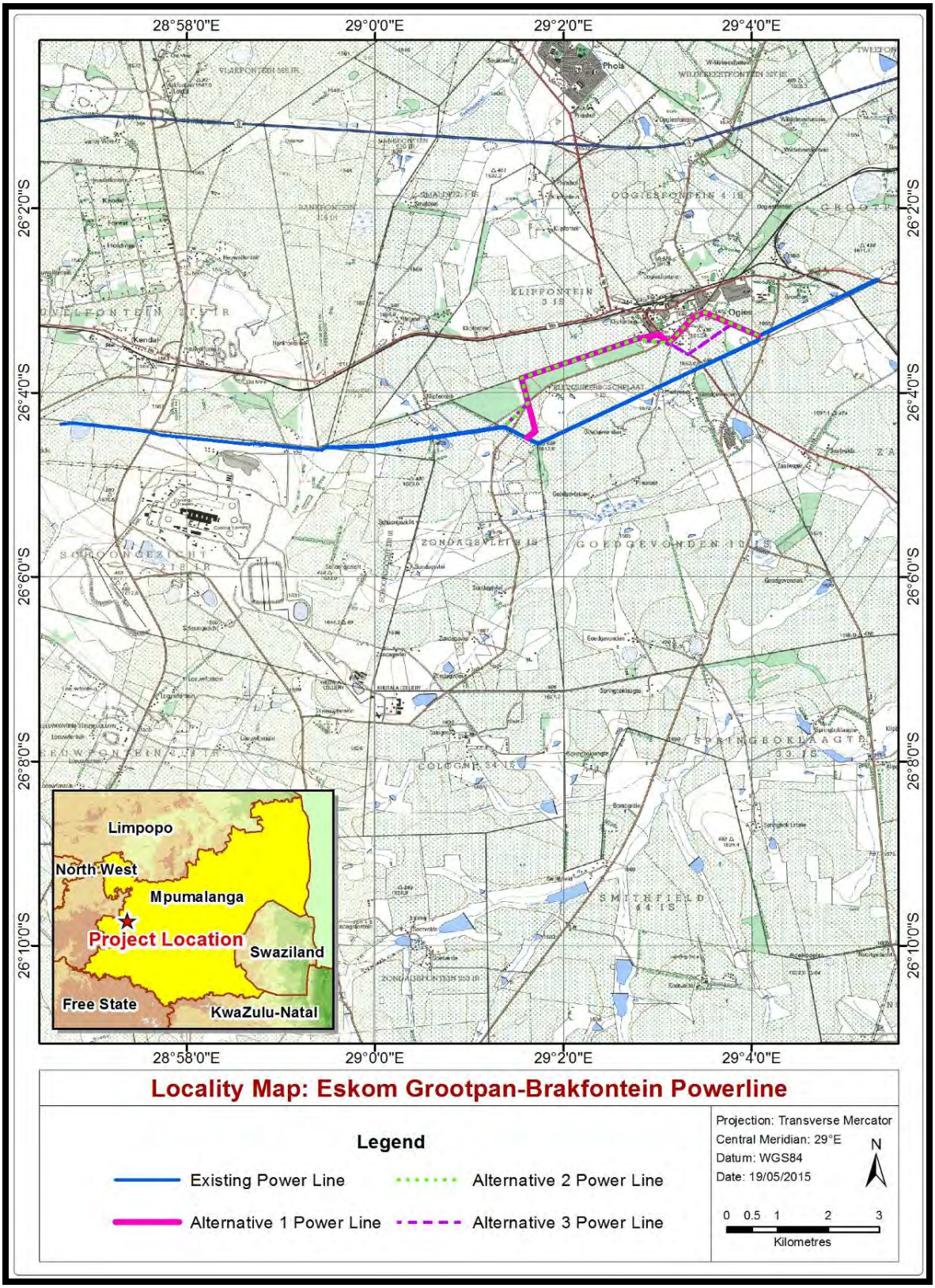

Figure 1: Locality map for the proposed Grootpan-Brakfontein powerline project

1.1 Objectives of the Ecological Survey/ Habitat Assessment

- To provide a basic description of the fauna and vegetation occurring along the current and proposed Grootpan-Brakfontein alignments. List the prominent plant species (trees, shrubs, grasses and other herbaceous species of special interest) present for vegetation unit and ecosystem delimitation.
- To identify animal/faunal species (mammals, birds reptiles, amphibians) of conservation importance; which could possibly occur along the Grootpan-Brakfontein alignments.
- To describe the available habitats on the Grootpan-Brakfontein alignments including areas of important conservation value or areas most likely to form important habitat for remaining threatened plant and animal species.
- To determine potential impacts of the development on the vegetation as well as associated fauna occurring along the proposed Grootpan-Brakfontein alignments.
- To provide management recommendations to mitigate negative and enhance positive impacts of the development.

1.2 Scope of Study

- A preliminary mammal, reptile and amphibian survey recording sightings and/or evidence of existing fauna and vegetation communities.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened animal species (Red Data Species), occurring or likely to occur within the proposed Grootpan-Brakfontein powerline alignments and immediate adjacent areas.
- To rank the two new 7km 88kV powerline alignments on the potential environmental impacts on associated fauna and vegetation.
- Identification of potential ecological impacts that could occur as a result of the removal of the existing Grootpan-Brakfontein lines as well as the two 7km 88kV powerline alignments and assess the significance of these, where possible.
- Investigate feasible and practical management recommendations that should be implemented to reduce or minimize the impacts, should the project be approved.
- Documentation of the findings of the study in a report.

2. METHODOLOGY

2.1 Predictive Methods

A 1:50 000 map of the study area was provided showing existing infrastructure, the existing Grootpan-Barkfontein alignments and the proposed two new 7km 88kV alignments. This was used as far as possible in order to identify potential “hot-spots” along the corridors, e.g. Patches of undisturbed Eastern Highveld grassland vegetation, palustrine wetlands (valley bottom wetlands (channelled and un-channelled), depressions/pans and hillslope seeps), dams and agricultural areas. Satellite imagery of the area was obtained from Google Earth was studied in order to get a three dimensional impression of the topography and land use.

2.2 Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur in the Ogies 2629 AA QDGC. The literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al,* 2009) and the internet using POSA (http://posa.sanbi.org accessed on the 20th of May 2015). *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU's MammalMap (http://vmus.adu.org.za/vm_sp_list.php accessed on the 20th of May 2015) for mammals. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. (Barnes 2000), *Roberts-Birds of Southern Africa VIIth ed.* (Hockey et al. 2005) as well as SABAP2 (http://sabap2.adu.org.za) for birds. The *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SAFAP FrogMap (http://vmus.adu.org.za accessed on the 20th of May 2015) The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) as well as SARCA ReptiMAP (http://sarca.adu.org.za accessed on the 14th of May 2015) for reptiles. The *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SARCA FrogMAP (http://sarca.adu.org.za accessed on the 20th of May 2015).

2.3 Site Investigation Methodology

A preliminary assessment of the status, spatial requirements and habitat preferences of all priority species along the existing and proposed new Grootpan-Brakfontein powerline corridors as well as potential threats was conducted. For certain faunal species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. For other species, little of this information was readily available and conservation targets remain speculative. Species assessments will be updated when additional data becomes available and where appropriate, proposed conservation targets will be revised.

Three general habitat sensitivity scans were carried out on the 21st-23rd of April 2015. These site visits did not entail intensive surveying or utilisation of any specialised sampling methods and can rather be viewed as being an opportunity to identify sensitive habitats occurring along the existing and proposed new Grootpan-Brakfontein powerline alignments.

All animals (mammals (larger), reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as animal tracks (footprints, droppings) to identify animals. The data was supplemented by previous surveys conducted in similar habitats, literature investigations, personal records and historic data. Different habitats were explored to identify any sensitive or specialized species. Habitats explored included Eastern Highveld Grassland (Gm12) in various forms of transformation (mining and agricultural lands) and degradation (secondary

succession grasslands (oldlands) overgrazing, frequent fires, alien vegetation invasion), wetlands including mainly channelled and broad un-channelled valley bottom wetlands, seasonal and permanently inundated pans/depressions and seasonally inundated seepage wetlands as well as artificially created dams on valley bottoms, stumps, moribund termite mounds and abandoned animal burrows. Mammal names are as used by Skinner and Chimimba (2005), reptile names by Bates *et al.* (2014) and Alexander and Marais (2007) and amphibian names by Du Preez and Carruthers (2005) and Minter *et.al.* (2004)

2.4 Uncertainties in Predicting Results

- Limitation to a base-line ecological survey for only 3 days (30 hours) during the late summer (April). Heavy rain had fallen the day prior to the site visits in April. The majority of dams and pans had sufficient surface water and amphibians had completed their short duration breeding activities.
- The majority of threatened plant and animal species are extremely seasonal only emerging after sufficient heavy early summer rainfall (November-March).
- The majority of threatened faunal species are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons/ years.
- Limitation of historic data and available databases for the areas.
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records) and previous surveys conducted in similar habitats between 1997-2015).

2.5 Gaps in the Baseline Data

- Little long-term, verified data of faunal species distribution on micro-habitat level along the proposed powerline alignments.
- Little long-term, verified data on impacts of existing lines, extensive agricultural and mining activities in the study area on the associated fauna.

3. VEGETATION AND FAUNAL HABITAT AVAILABILITY

Vegetation structure is generally accepted to be more critical in determining faunal habitat than actual plant composition. Therefore, the description of vegetation presented in this study concentrates on factors relevant to faunal species abundance and distribution, and does not give an exhaustive list of plant species which occur in the study area. No comprehensive vegetation or faunal surveys were conducted due to time and financial constraints and faunal species lists provided are of species most likely to occur on the site using habitat as an indicator of species presence. The study area falls within the 2629AC and 2629AD quarter degree grid cells. This study will take both these two grid cells into account as the study area is equally spread across both of them. Vegetation composition in consists of **Eastern Highveld Grassland (Gm 12)** as well as **Eastern Temperate Freshwater Wetlands (AZf 3)** (Mucina & Rutherford 2006) – Figure 2.

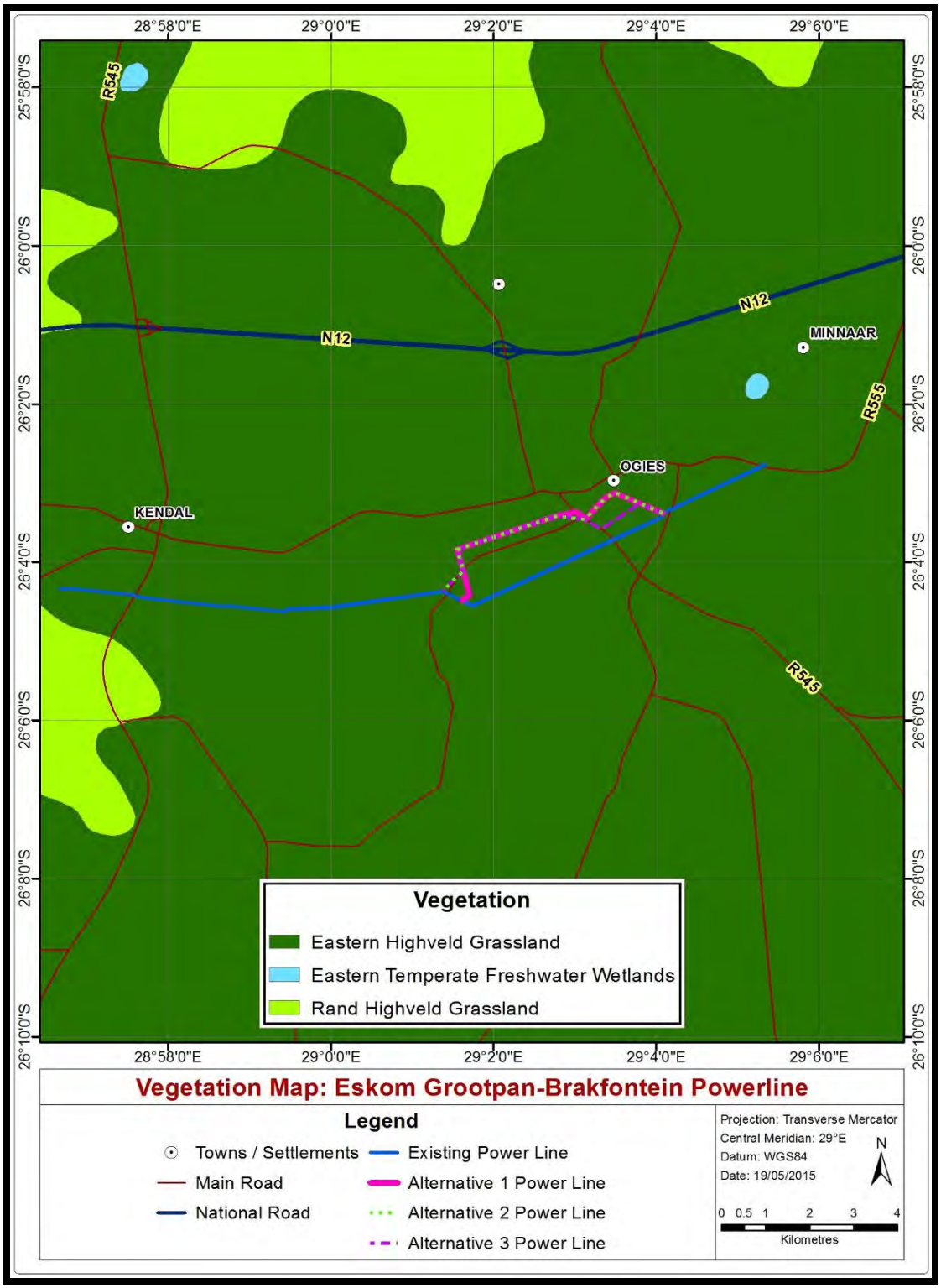

Figure 2: Vegetation map for the existing and proposed Grootpan-Brakfontein alignments (adapted from Mucina & Rutherford 2006)

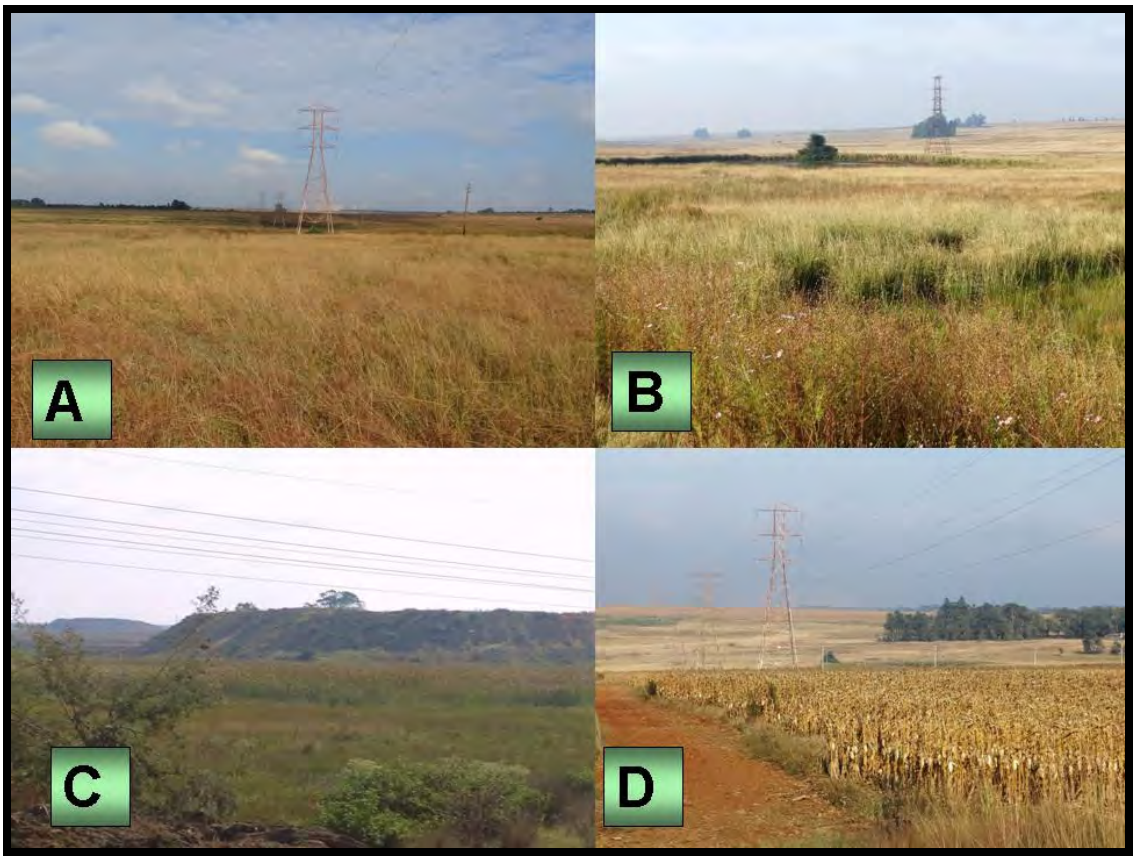

Figure 3: Conglomerate of photographs displaying the major habitats observed along the existing Grootpan-Brakfontein and proposed new alignments

- **A:** The majority of the existing Grootpan-Brakfontein alignments are situated within Eastern Highveld Grasslands in various stages of transformation and degradation. Large sections of the alignment are situated within transformed or secondary succession *Hyparrhenia hirta* grasslands. The grasslands adjacent to the mining and intensive agricultural areas are heavily transformed and degraded and dominate by pioneer weedy plant species. The grasslands adjacent to the proposed two new 7km 88kV alignments are heavily degraded or transformed secondary succession grasslands with limited geophytes, forbs and herbs. Large sections are heavily invaded by pioneer weedy grass and plant species.
- **B:** The existing Grootpan-Brakfontein powerline bisects and runs adjacent to channelled and un-channelled valley bottom wetlands. The adjacent moist grasslands are currently utilised for extensive livestock grazing activities by cattle. The existing alignment bisects the large perennial Grootpan adjacent to the Kendall Power-station.
- **C:** Large areas adjacent to the existing powerline alignments have been transformed due to extensive mining activities. Several large collieries occur in the area.
- **D:** Extensive agricultural lands were observed in the area. Current Maize (*Zea mays*) and Soya Bean lands, planted grass (*Eragrostis teff*) pastures as well as fallow lands were

observed along the existing and the proposed alignments as well as exotic *Eucalyptus* plantations.

3.1 Eastern Highveld Grassland (Gm12)

The majority of the Grootpan-Brakfontein alignments are situated within Eastern Highveld Grassland in various stages of transformation and degradation. This vegetation unit is distributed in Mpumalanga and Gauteng Provinces on the plains between Belfast in the east and the eastern-side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief. The vegetation is short dense grass dominated by the usual highveld grass composition (*Aristidia, Digitaria, Eragrostis, Themeda, Tristachya* etc) with small rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra, Celtis africana, Diospyros lycioides* subs *lyciodes*, *Parina capensis, Protea caffra, P.welwithchii and Rhus magaliesmontanum*).

Sour grassland generally occurs in high rainfall areas on leached soils. Vegetation is relatively short and dense, and nutrients are withdrawn from the leaves during the winter months. The predominant rock types are shales and sandstones of the Vryheid and Volksrust Formations (Ecca Group, Karoo Sequence), giving rise to deep, red to yellow, sandy soils (Mucina & Rutherford 2006).

Large portions adjacent to the alignments have been historically and currently utilised for intensive irrigated agricultural activities. Large mono-cultured maze lands, soya beans and planted grass pastures were observed. The remnant patches of open grassland round the Grootpan-Brakfontein alignments are dominated by *Aristida congetsta* and *Aristida juncifromis subsp. galpinii, Cynodon dactylon, Eragrostis curvula* as well as *Hyparrhenia hirta* and *Heteropogon contortus*. No low-lying rocky outcrops were observed along the alignments during the brief field survey.

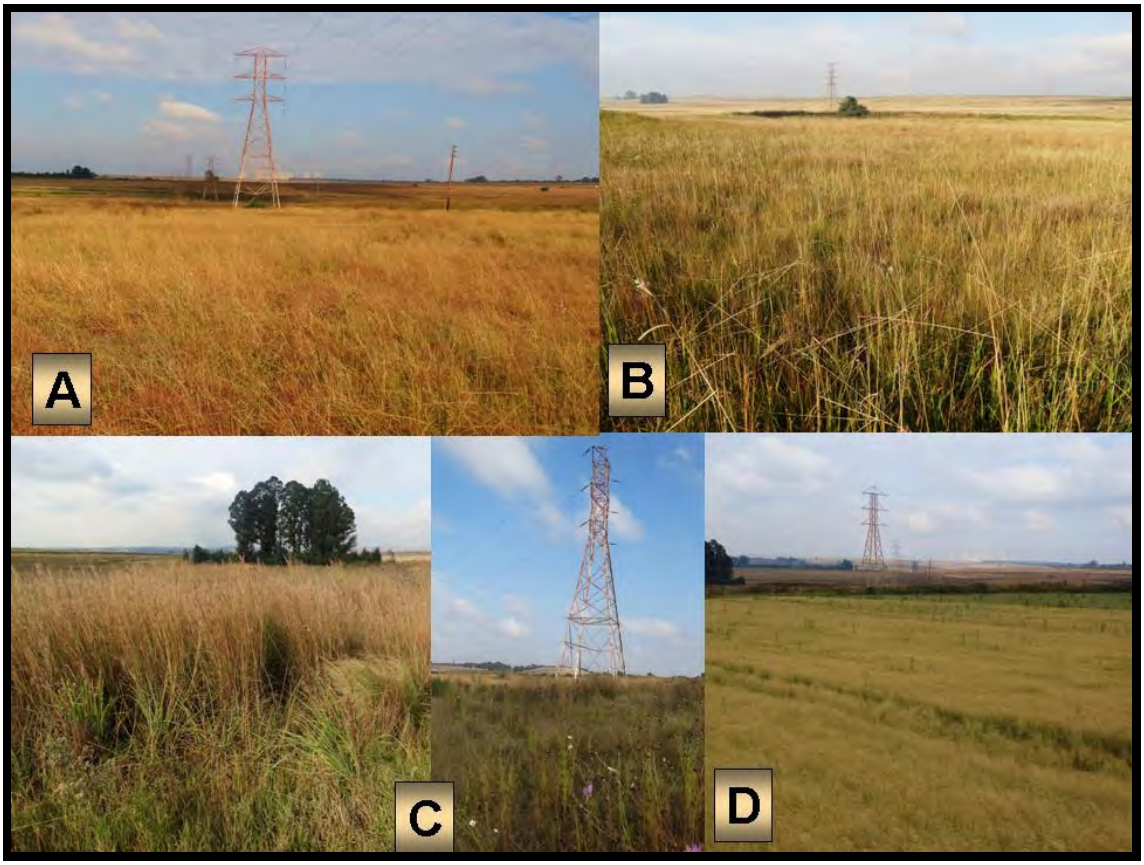

Figure 4: Collage of photographs displaying the Eastern Highveld Grassland in various stages of transformation and degradation

- **A:** Remnant patches of sour grassland dominated by *Aristida congesta, Digitaria monodactyla, Eragrostis curvula, Setaria spacelata* occur under the existing powerline servitude.
- **B:** Moist grassland occurs adjacent to the broad un-channelled valley bottom wetlands and is dominated by hygrophilous and hydrophilic grass species such as *Aristida junciformis* subsp. *galpinii, Eragrostis gummiflua, Sporobolus africanus, Sporobolus fimbriatus, Trachypogon spicatus* and *Imperata cylindrica*. These areas are currently utilised for livestock grazing areas.
- **C:** Large sections of the existing and two new 7km 88kV alternative alignments are situated within transformed grasslands dominated by anthropogenic weedy grass species such as *Hyparrhenia hirta, Heteropogon contortus, Aristida congetsa, Cynodon dactylon* and the exotic invasive *Pennisetum clandestinum**.
- **D:** Planted pasture grasslands (*Eragrostis tef*) occur in certain sections of the existing powerline servitude.

Table 1: Dominant vegetation observed within the Grootpan-Brakfontein alignments situated within the Eastern Highveld vegetation unit

Species	Species
Trees:	**Succulents:**
**Acacia mearnsii*	**Agave americana*
**Eucalyptus camaldulensis*	*Aloe greatheadii*
**Eucalyptus grandis*	
Grasses:	**Herbs / cont.:**
Aristida congesta	**Bidens pilosa*
Aristida junciformis subsp.*galpini*	**Tagetes minuta*
Themeda triandra	*Flaveria bidentis*
Melinis repens	*Hypochoeris radicata*
Elionurus muticus	**Nidorella hottentotica*
Eragrostis chlorantha	*Seriphium plumosum*
Cymbopogon plurinodes	*Crabbaea acaulis*
Digitaria eriantha	*Hermannia sp.*
Setaria nigrirostris	*Scabiosa sp.*
Trachypogon spicatus	*Albuca* sp.
Heteropogon contortus	*Ledebouria ovatifolia*
Brachyaria serrata	*Geigeria burkei*
Alloteropsis semialata	*Amaranthus hybridus*
Trachypogon spicatus	**Datura strumuarium*
Diheteropogon amplectens	**Plantago lanceolata*
Digitaria monodactyla	*Polygala uncinata*
Sporobolus africanus	*Commelina africana*
Bulbostylis humilis	*Helichrysum nudifolium*
Andropogon schirensis	*Harplochoa scaposa*
Cynodon dactylon	*Asclepias affinis*
Eragrostis racemosa	*Anthospermum sp.*
Alloteropsis semialata	*Monsonia attenuate*
Eragrostis curvula	**Schkuhria pinnata*
Setaria sphacelata	*Solanum incanum*
Imperata cylindrica	**Solanum mauritianum*
Herbs:	*Acalypha caperonioides*
Ledebouria ovatifolia	*Arctotis arctotioides*
Aster harveyana	*Pentanisia prunelloides*
Pelargonium luridum	*Dipcadi viride*
Gnidia caffra	*Chenopodium album*
Rhynchosia totta	*Becium obovatum*
Castalis spectabilis	*Berkheya setifera*
Helichrysum pilosellum	*Elephantorrhiza elephantina*
Alysicarpus rugosus	**Campuloclinium macrocephalum*
Hypoxis hemerocallidea	*Cosmos bipinnatus*
Hypoxis rigidula	*Gomphocarpus fruticosus*
Ipomoea crassipes	*Chamaecrista biensis*
Justicia anagalloides	*Hermannia transvaalensis*
Kohoutia amatymbica	*Gnidia krausiana*
**Verbena brasiliensis*	*Lepidium bonariense*
Walafrida densiflora	*Helichrysum rugulosum*
Monopsis decipiens	*Vernonia oligocephala*

*alien & weedy vegetation

Eastern Highveld Grassland is very suitable for crop production, with the natural vegetation heavily used for grazing of sheep and cattle. The conservation status of this vegetation type is very poor and is listed as **Endangered** with only a fraction conserved. Moist Sandy Highveld Grassland is now largely ploughed, with natural vegetation restricted to patchy remnants, which are often heavily grazed. The Nooitgedacht Dam Nature Reserve and Jericho Dam Nature Reserves are the only official statutory conservation areas of this vegetation type as well as private reserves (Holkranse, Kransbank, Morgenstond). Some 44% is transformed primarily by cultivation, plantations and mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact, indicated by land-cover.

The majority of Eastern Highveld Grassland along and surrounding the alignments has been completely transformed due to the adjacent agricultural and mining activities in the area and are dominated by Black Jacks (*Bidens pilosa*), Khaki Bush (*Tagetes minuta*) and Cosmos (*Cosmos bipinnatus*). The majority of tree species found along the alignments are exotics (Oaks, *Quercus sp.*) as well as alien invasive species such as *Eucalyptus grandis*, *Eucalyptus camaldulensis*, *Acacia mearnsii*, *Acacia dealbata*, *Salyx babylonica, Populus alba, Populus x casnescens*). Patches of secondary grasslands (old agricultural lands) are situated along the proposed new 7km 88kV alignments. While disturbed grasslands have evidently been impacted on by various anthropogenic disturbances, these areas are still considered to have some ecological value, albeit limited. This is mostly due to the role of these areas providing habitat for remaining faunal species.

One threatened or 'orange' listed plant was recorded in a remnant patch of moist grassland under the existing Grootpan-Brakfontein powerline servitude during the brief field survey namely a single 'Declining' African Potato, *Hypoxis hemerocallidea*. A taxon is 'Declining' when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population. No further populations were observed within and adjacent to the existing powerline servitude during the brief field survey. No threatened plant species were observed within the transformed grasslands within which the two new 7km 88kV alternative alignments are situated.

3.2 Palustrine Wetlands

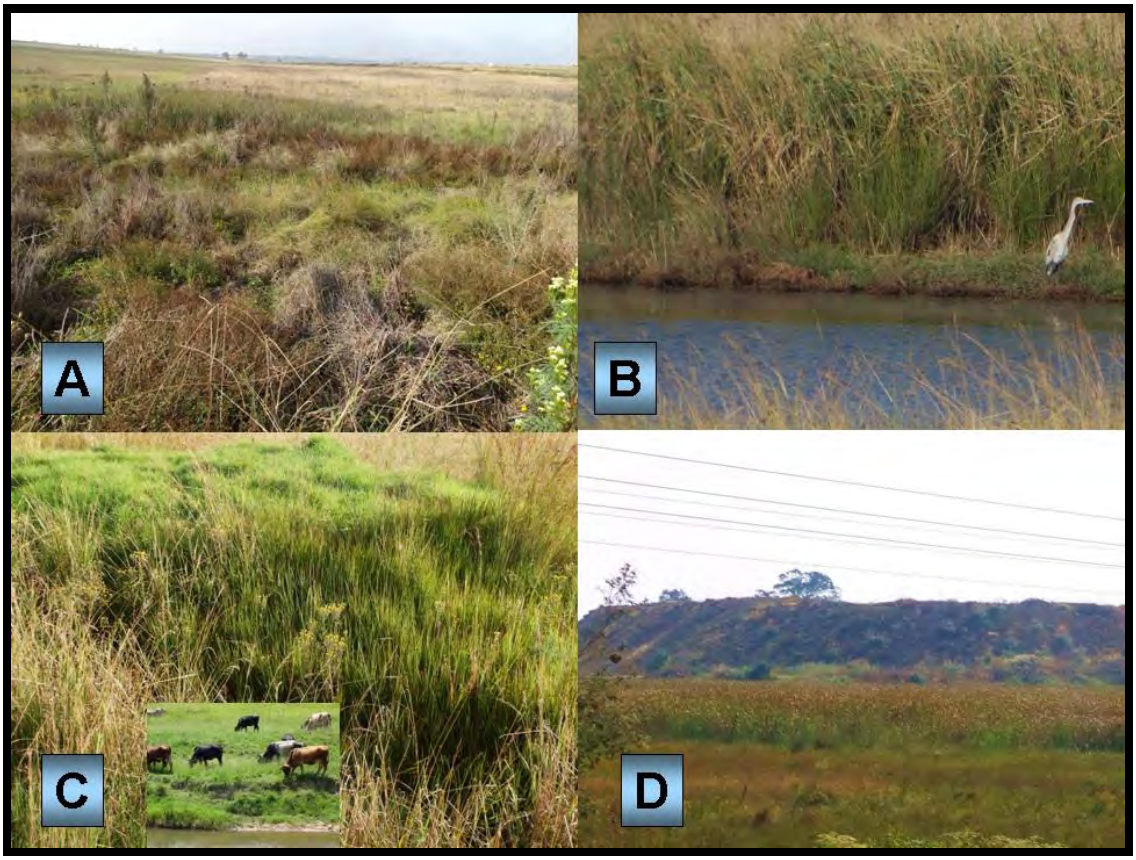

Figure 5: Collage of photographs displaying the dominant palustrine wetland habitat observed within and adjacent to the powerline servitudes

- **A:** The existing Grootpan-Brakfontein alignments bisect and run adjacent to seasonally inundated broad un-channelled and channelled valley bottom wetlands. The existing towers are situated within the seasonal wet zones of the valley bottom wetlands as well as the temporary wet zones of the adjacent moist grassland or seepage wetlands.
- **B:** Artificially created dams have been constructed within the valley bottom wetlands. The majority of the dams are seasonally inundated.
- **C:** The wetlands within the study area are heavily impacted on by livestock grazing and drinking activities. Extensive overgrazing and trampling of the hygrophilous grass and sedge vegetation within the valley bottom wetlands as well as adjacent moist grassland results in the dominance of the dwarf shrub *Seriphium plumosum*. It has been shown that heavy grazing has a detrimental effect on the hydrological state of wetlands, these include: disruption of flow patterns by paths, gully erosion, silting up of pools, encroachment of marginal vegetation into the wetland area, etc. Large portions of the valley bottom wetlands have become heavily degraded due to adjacent agricultural activities and invaded by *Pennisetum clandestinum** as well as Pom Pom Weed, *Campuloclinium macrocephalum**.

- **D:** The extensive coal mining activities adjacent to the existing and proposed new lines have resulted in severe degradation and transformation of the valley bottom wetlands and adjacent seepage wetlands.

Present in the lower-lying valley bottoms as well as endorheic pans in the study area is an azonal vegetation unit known as **Eastern Temperate Freshwater Wetlands** (AZf3; Mucina *et al*. 2006). This vegetation unit is embedded within the Grassland Biome and can best be described as wetland vegetation surrounding bodies of water and periodically flooded areas. It occurs in the Northern Cape, Eastern Cape, Free State, North-West, Gauteng, Mpumalanga and KwaZulu-Natal Provinces as well as in neighbouring Lesotho and Swaziland around water bodies with stagnant water (lakes, pans, periodically flooded vleis, edges of calmly flowing rivers) with altitudes ranging from 750–2 000m.

The wetlands vegetation primarily comprises grasses and sedges with very few trees and no shrubs present. Vegetation covers 85% of the total land cover with bare soil comprising ~15% of the total cover. Soils are hydromorphic clays to humus-rich black turfs. The topography or slope is between 1~4° and drainage is good along the channelled and un-channelled valley bottoms but poor in the seasonally and permanently inundated pans or depressions with conditions becoming moister towards the centre of the wetland. Degraded sections are dominated dense stands of *Pennisetum clandestinum*, Phragmites australis, Populus x canescens, Imperata cylindrica*, *Bidens pilosa, Tagetes minuta, Campuloclinium macrocephalum** and *Cosmos bipinnatus*. Rocks are absent.

Dominant grass and sedge species are *Phragmites australis, Typha capensis, Schoenoplectus corymbosus*, *Cyperus margaritaceus, Sporobolus fimbriatus, Leersia hexandra, Imperata cylindrica* and *Mariscus dregeanus.* Indigenous herbs include hydrophilic or moisture-loving species *Persicaria lapathifolium* and *Polygonum attenuata* together with the *Berkheya setifera*, *Rumex lanceolatus, Pelargomium luridum, Wahlenbergia undulata.* The vegetation is dominated by grass and sedge species reaching a height of ~2.5 m (*Typha capensis* and *Phragmites australis*) while the herbaceous component (averaging 40 cm tall) comprises a cover of about 5%, with only one tree species present (**Salyx babylonica*). Indigenous herbs were scarce, as they cannot cope with the moist conditions and only specialized wetland herbs are present together with some generalist species.

Table 2: Dominant vegetation observed within the palustrine wetland habitats observed along and adjacent to the alignments

Species	**Herbs**
Trees	*Helichrysum nudifolium*
**Acacia mearnsii*	*Sium repandum*
**Sesbania punicea*	*Limosella longiflora*
Grasses & Sedges	*Ludwigia sp.*
Eleocharis dregeana	*Cycnium sp.*
Leersia hexandra	*Pycnostachys reticulata*
Phragmites australis	*Persicaria amphibia*
Andropogon huillensis	*Pesricaria lapathifolia*

Species	Herbs
Agrostis eriatha	*Marsilea sp.*
Koeleria capensis	*Mentha aquatica*
Juncus dregeanus	*Rumex lanceolatus*
Typha capensis	*Cycnium adonense*
Andropogon eucomis	*Epilobium hirsutum*
Ascolepis capensis	*Floscopa glomerata*
Isolepis costata	*Wahlenbergia undulata*
Juncus oxycarpus	*Polygonum attenuata*
Ficinia scirpioides	*Ranunculus multifidus*
Cyperus congestus	*Ledebouria cooperi*
Cyperus longus	*Chironia purpurescens*
Cyperus squarrosus	*Monopsis decipiens*
Paspalum urvilei	**Cirsium vulgare*
Agrostis eriatha	*Centella asiatica*
Fuirena pubescens	*Hypericum lalandii*
Setaria sp.	*Lobelia flaccida*
Schoenoplectus decipiens	**Rorippa nasturtium-aquaticum*
**Pennisetum clandestinum*	*Commelina benghalensis*
Imperata cylindrica	*Berkheya setifera*
Sporobolus fimbriatus	
Eragrostis gummiflua	

The percentage of area of this vegetation unit that is protected is 4.6% (NSBA) with a conservation target of 24% (NSBA) with 85.1% (NSBA) remaining intact it is classified as **least threatened** but poorly protected and is conserved in the Blesbokspruit (Ramsar site), Hogsback, Marievale, Olifantsvlei, Seekoeivlei (a Ramsar site), Wakkerstroom Wetland, Umgeni Vlei, Umvoti Vlei and Pamula Park Nature Reserves. It is also protected in private nature reserves such as the Korsman Bird Sanctuary and Langfontein. The area comprised by this vegetation unit is 556.77km^2 with some 15% having been transformed to cultivated land, urban areas or plantations. In places intensive grazing and use of lakes and freshwater pans as drinking pools for cattle or sheep cause major damage to the wetland vegetation because of trampling and grazing in the winter months when greens are scarce elsewhere but present in the wetland due to moisture (hydromorphic soils) present there.

No Red Data or Orange Listed plant species were recorded during the brief field within the valley bottom wetlands. Suitable habitat occurs within the broad un-channelled valley bottom wetlands and channelled valley bottom wetlands for the Orange listed *Eucomis autumnalis*, *Crinum bulbispernum* and *Crinum macowanii*. They are classified as “Declining’.

3.3 Agricultural Lands

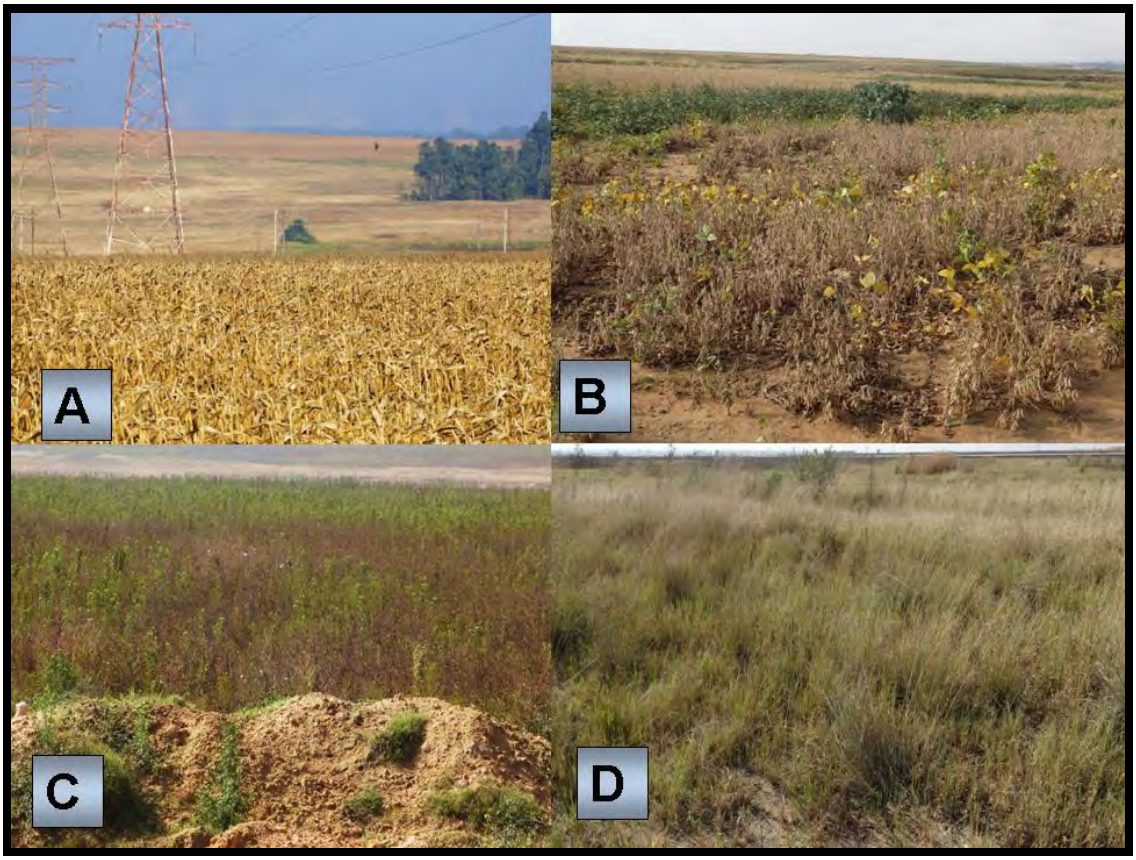

Figure 6: Extensive agricultural lands (old and current) were observed adjacent to the proposed alignments

- **A:** Maze is the dominant crop in the area with extensive centre-pivot irrigated agricultural lands.
- **B:** Soya beans have been planted in certain areas as well as pasture grasslands.
- **C:** Old or fallow lands are dominated by extensive stands of pioneer weedy plant species such as *Cosmos bipinnatus, Tagtes minuta, Bidens pilosa*.
- **D:** Secondary succession grasslands occur on certain fallow lands and are dominated by anthropogenic grass species such as *Hyparrhenia hirta, Aristida congesta* and *Cyodon dactylon*.

The soils within the maize lands were sandy soils which are regularly ploughed/tilled. This community primarily comprises grasses and numerous weedy forbs with no trees or shrubs. Vegetation cover comprises 50% of the total land cover. The bare soil cover is comprises ~35% with red to yellow sandy soils derived from weathered sandstone base rock. The slope is more or less level and drainage is good. Rocks are absent although small chips of shales and sandstones approximately 1-2 cm in diameter were observed in certain areas.

Dominant grass species are the anthropogenic species such as *Hyparrhenia hirta*, *Eragrostis curvula, Cynodom dactylon* as well as the exotic **Pennisetum clandestinum* (kikuyu). Weeds dominated the herbs component including *Lepidium bonariense, Cosmos bipinnatus, Chenopodium album, Tagetes minuta, Gomphocarpus fruticosus, Conyza bonariensis*, and *Flaveria bidentis.* Alien invasive tree species include declared Category 1b invader tree Acacia mearnsii* and *Eucalyptus camaldulensis* the grass *Pennisetum clandestinum* and the Category 1 forbs *Cirsium vulgare* and *Datura stramonium.*

Table 3: Species found in the fallow or old land community

Species	**Species**
Trees:	**Succulents:**
**Eucalyptus* sp.	None
**Acacia meamsii*	
	Herbs / cont.:
Grasses & sedges:	**Verbena brasiliensis*
**Pennisetum clandestinum*	*Cleome maculata*
Trichoneura grandiglumis	**Cerastium arabidis*
Hyparrhenia hirta	*Alternanthera pungens*
**Cynodon dactylon*	**Cosmos bipinnatus*
Cymbopogon plurinodis	*Chamaecrista biensis*
Heteropogon contortus	**Oxalis corniculata*
Tragus berteronianus	**Amaranthus hybridus*
Eragrostis curvula	**Conyza bonariensis*
Aristida congesta subsp. congesta	*Commelina africana*
Herbs:	**Schkuhria pinnata*
Cleome monophylla	**Bidens bipinnata*
Sida rhombifolia	**Datura stramonium*
Corchorus confuses	**Bidens pilosa*
Chenopodium glaucum	**Argemone orochleura.*
**Flaveria bidentis*	*Flaveria bidentis*
**Datura ferox*	*Lepidium bonariense*

No Red List species or rare species were recorded or likely to occur within these transformed vegetation units along and adjacent to the proposed alignments.

3.4 Exotic Trees or Plantations

Figure 7: Afforested plantations of Blue-gum (*Eucalyptus* spp.) trees

Afforested plantations of Blue-gum (*Eucalyptus* spp.) trees were observed in the study area, particularly near the human settlements of Ogies. The proposed new 88kV alternative line runs adjacent to a *Eucalyptus* plantation to the west of Ogies. Whilst in general exotic vegetation has little value for most faunal species, in this study area, the lack of other trees means that these stands may be used by some faunal species such as Common Duiker, Porcupine as refuge habitat.

Alien invasive tree species observed included Black Wattle (*Acacia mearnsii*), Blue Gum (*Eucalyptus spp.*), Grey Poplars (*Populus x censescens*). Dominant grass species are the anthropogenic species such as *Hyparrhenia hirta*, *Eragrostis curvula, Cynodom dactylon* as well as the exotic **Pennisetum clandestinum* (kikuyu). Weeds dominated the herbs component. No Red List species, medicinal or rare species were recorded or likely to occur within these transformed vegetation units along the proposed two new 88kV alternative alignments.

3.5 Protected Tree Species

In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Agriculture (now Department of Agriculture, Forestry and Fisheries) developed a list of protected tree species. In terms of Section

15 (1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. No protected tree species or indigenous tree species were observed or occur within the existing and proposed new 88kV alignments. All trees observed were exotic and mainly alien invasive species (Category 1 & 2) namely *Eucalyptus grandis*, Eucalyptus camaldulensis*, Morus alba*, Salyx babylonica**, *Populus x canescens**.

3.6 Red Data Species

Figure 8: African Potato (*Hypoxis hemerocallidea*)

A single orange listed 'Declining' African Potato (*Hypoxis hemerocallidea*) was observed under the existing Grootpan-Brakfontein servitude. Low numbers are expected due to high levels of medicinal plant harvesting within the remaining open grasslands.

Table 4: List of red data species that could possibly occur in the larger Ogies area

Family	Genus	Species	National Status	Comments
AIZOACEAE	*Frithia*	*humilis*	EN	Habitat not suitable within existing and proposed new powerline servitudes.
AMARYLLIDACEAE	*Crinum*	*bulbispermum*	Declining	Habitat not suitable within proposed new 88kV alignments. Suitable habitat within the adjacent valley bottom wetlands.
AMARYLLIDACEAE	*Crinum*	*macowanii*	Declining	Habitat not suitable within proposed new 88kV alignments. Suitable habitat within the adjacent valley bottom wetlands.
HYACINTHACEAE	*Eucomis*	*autumnalis*	Declining	Habitat not suitable within proposed new 88kV alignments. Suitable habitat within the adjacent valley bottom wetlands.
HYPOXIDACEAE	*Hypoxis*	*hemerocallidea*	Declining	Confirmed present within existing powerline servitude.

One red listed Declining'* plant species namely a single African Potato (*Hypoxis hemerocallidea*) was observed within the current Grootpan-Brakfontein servitude. No suitable habitat occurs within the proposed two new 7km 88kV alternative alignments. Suitable habitat occurs within the existing powerline servitude within the broad valley bottom wetland for *Crinum bulbispermum*, *Crinum macowanii* and *Eucomis autumnalis.* None were observed during the brief site visit and this section of the powerline is remaining and not been removed; so no further impact should occur within this sensitive wetland habitat.

* A taxon is 'Declining' when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.

3.7 Alien Vegetation

Alien and invasive plant species can be grouped three categories:

- Category 1 plants are weeds that serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment. These plants need to be eradicated using the control methods stipulated in Regulation 15.D of the CARA (1983).
- Category 2 plants are plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas.
- Category 3 plants are mainly used for ornamental purposes in demarcated areas but are proven plant invaders under uncontrolled conditions outside demarcated areas.

Alien invasive species recorded included *Agave americana*, Acacia mearnsii*, Datura stramonium*, Campuloclinium macrocephalum*, Ipomoea purpurea**, *Eucalyptus grandis**, *Eucalyptus camaldulensis, Cirsium vulgare*, Phytolacca octandra, Sesbania punicea**, *Melia azedarach*, Morus alba*, Ricinus communis, Solanum panduriforme*, Solanum mauritianum*, Populus x canescens*[*] and *Salyx babylonica**. These species should be removed and eradicated from the existing and proposed new servitudes.

3.8 Land Degradation

The study area is located within an area where soil erosion is regarded as insignificant with large areas being mined for coal and others ploughed for crop production. Grazing by cattle has also had a significant effect on remaining open grassland areas with heavy and mild overgrazing leading to degradation of the remaining open grassland. Various wetlands including endorheic pans, valley bottom wetlands and seasonally inundated seepage wetlands occur within the region however, some areas have been negatively affected by adjacent coal mining activities as well as uncontrolled livestock grazing and trampling along the valley bottom wetlands. The grasslands adjacent to the Ogies township are transformed and heavily degraded due to illegal dumping activities, alien invasive vegetation and frequent fires.

4. RESULTS OF THE INITIAL FAUNAL SURVEY OR HABITAT ASSESSMENT

This preliminary faunal survey focused mainly on mammals, birds, reptiles and amphibians which could possibly occur within and adjacent to the proposed Grootpan-Brakfontein powerline servitudes. The survey focused on the current status of threatened animal species occurring, or likely to occur within the Ogies study area, describing and mapping the available and sensitive habitats (see Figure 16 - Preliminary Sensitivity Map). Faunal data was obtained during a 3 day field survey of the proposed Grootpan-Brakfontein powerline servitudes. All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. Birds were identified with the use of binoculars (Stiener 10x50), Newman's Field Guide as well as by individual calls. Amphibians were identified by visual observations of adults as well

[*] exotic or alien invasive vegetation