



DIGBY WELLS
ENVIRONMENTAL



Environmental Impact Assessment for Eskom's Northern KwaZulu-Natal Strengthening Project

Avifauna Screening Assessment

Project Number:

ILI3864

DEA Reference:

14/12/16/3/3/2/1036 – Normandie-Iphiva 400 kV Powerline

14/12/16/3/3/2/1037 – Iphiva Substation

14/12/16/3/3/2/1038 – Iphiva-Duma 400 kV Powerline

Prepared for:

NAKO ILISO

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EXECUTIVE SUMMARY

ILISO Consulting (Pty) Ltd, trading as NAKO ILISO, appointed Digby Wells Environmental (hereinafter Digby Wells) in respect of the Eskom Holdings SOC Ltd (hereinafter Eskom) Northern KwaZulu-Natal (KZN) Strengthening Project. The Project will entail four separate applications for Environmental Authorisation (EA) comprising:

- A new Iphiva Substation;
- Establishment of 132 kV Distribution lines;
- The Iphiva – Duma 400 kV Powerline; and
- The Normandie – Iphiva 400 kV Powerline.

The Terms of Reference (ToR) of this avifauna screening and comparative specialist study was to evaluate the presence of sensitive avifaunal species and habitat present that could be affected by the various options available for the project infrastructure. Thereafter to determine the preliminary impacts on the protected species and recommend mitigation measures to alleviate negative impacts.

The consideration of alternatives for the project infrastructure, from an avifaunal perspective, was primarily determined by the ecological sensitivity present in each alternative, this approach is discussed below.

In terms of avifaunal sensitivity, the following features are assessed to determine how sensitive the species or their habitats identified within the alternatives are:

- Presence or absence of Red Data or protected bird species;
- Presence or absence of exceptional Avifaunal species diversity;
- Extent of intact habitat in good ecological condition in the absence of disturbance; and
- Presence or absence of important ecosystems protected areas, such as Important Bird Areas, Protected Areas, areas demarcated for future protected area status (NPAES) and wetlands.

The results of the comparison of alternatives demonstrated the following preferred options from an avifaunal perspective:

1. Iphiva 6 Substation;
2. West routing alternative for the Iphiva-Makhathini / Iphiva-Mbazwane distribution line;
3. All below ground design options for the 132 kV distribution line along the P234 corridor;
4. Iphiva – Duma West 1 (including associated mitigation deviation); and
5. Normandie – Iphiva 2 400 kV alternative.

Based on Digby Wells' understanding of the Project and the results of this assessment, and discussions and comments from stakeholders, the following recommendations/mitigations were suggested:

- A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers.
- The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr.
- Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands;
- Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action;
- Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted.
- Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and
- Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants).

DECLARATION

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I, Phillip Patton, as duly authorised representative of Digby Wells and Associates (South Africa) (Pty) Ltd., hereby confirm my independence (as well as that of Digby Wells and Associates (South Africa) (Pty) Ltd.) and declare that neither I nor Digby Wells and Associates (South Africa) (Pty) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of Eskom SOC Ltd, other than fair remuneration for work performed, specifically in connection with the Fauna and Flora management process proposed for the Eskom Northern KwaZulu-Natal Strengthening Project, located in KwaZulu-Natal Province.

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Compliance with Appendix 6 of GN 326 of 7 April 2017

Regulatory Requirements	Section of Report
(a) The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process.	Appendix A
(b) a declaration that the person is independent	Page iii
(c) an indication of the scope of, and the purpose for which, the report was prepared	Section 5.1
(cA) an indication of the quality and age of base data used for the specialist report	Section 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 6
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 5.3
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Section 5.2 and 5.4, Section 7
(g) an identification of any areas to be avoided, including buffers	Section 5
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 7
(i) a description of any assumptions made and any uncertainties or gaps in knowledge	Section 3
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Section 9
(k) any mitigation measures for inclusion in the EMPr	Section 9
(l) any conditions for inclusion in the environmental authorisation	Section 9
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6, 9



Regulatory Requirements	Section of Report
<p>(n) a reasoned opinion—</p> <p>(i) whether the proposed activity, activities or portions thereof should be authorised;</p> <p>(iA) regarding the acceptability of the proposed activity or activities; and</p> <p>(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan</p>	
<p>(o) a description of any consultation process that was undertaken during the course of preparing the specialist report</p>	Section 8
<p>(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto</p>	Section 8
<p>(q) any other information requested by the competent authority</p>	

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1 Introduction

ILISO Consulting (Pty) Ltd, trading as NAKO ILISO, appointed Digby Wells Environmental (hereinafter Digby Wells) in respect of the Eskom Holdings SOC Ltd (hereinafter Eskom) Northern KwaZulu-Natal (KZN) Strengthening Project.

This avifauna report forms part of the Environmental Authorisation (EA) process and aims to comply with national and provincial legislation with regards to biodiversity conservation. Furthermore, it will identify rate and provide mitigation measures for impacts that may arise from the project activities as they are outlined in this document.

1.1 Project Background

Transmission powerlines transport electricity generated at power stations to predetermined locations. At present, the Normandie and Impala Main Transmission Substations, approximately 80 km north-west of Pongola and 180 km south of Makhatini Flats respectively, supply northern KZN network. With an increase in electricity demand in this region of KZN, voltages are approaching unacceptable low levels. Furthermore, the network is experiencing high voltage drops and thermal loading of the remaining network due to the contingencies on the main 132 kilovolt (kV) supplies.

Eskom recognises these constraints to the current network, and have proposed the implementation of the Northern KZN Strengthening Project ("*the Project*"), as described in Section **Error! Reference source not found.** For this Project to be realised, Eskom is required to undertake an EA process in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

1.2 Project Description

The intent of the Project is to "de-load" the primary sub-transmission network and improve voltage regulation to alleviate existing and future network constraints in northern KZN.

To achieve this strategic objective, Eskom plans to construct the new Iphiva 400/132 kV Substation near the town of Mkuze, which will be integrated into the 400 kV network by two 400 kV lines. These will comprise the following:

- The 120 km Normandie – Iphiva 400 kV powerline; and
- The 130 km Iphiva - Duma 400 kV powerline.

To accommodate the towers and overhead lines of the 400 kV Transmission powerlines, a 55 m servitude (27.5 m on either side of the centre line) is required. The servitude is required to ensure safe construction, maintenance and operation of the line and Eskom will be entitled to unrestricted access. Where 400 kV power lines are constructed in parallel, a minimum separation distance of 55 m between centre points is required.

In addition to the two 400 kV lines, 165 km of 132 kV Distribution power lines will also link into the Iphiva Substation.

The various components of this Project are presented separately below.

1.2.1 Iphiva Substation (Ref. No. 14/12/16/3/3/2/1037)

A substation must be situated within proximity to an existing network, in this instance the existing 132 kV KZN network. It is envisaged that a total footprint of 400 x 400 m (i.e. 16 ha) will be required for the development footprint, within a site-specific study area of 1 x 1 km. The 16 ha development footprint area includes provisions for an 80 m high microwave radio communication mast, oil and fuel storage facilities, and an oil bund to contain any accidental transformer oil spills.

The proposed substation will comprise standard electrical equipment, including but not limited to:

- Transformers;
- Reactors;
- Busbars; and
- Isolators.

In respect of this Project, two (2) alternate locations were considered. These comprised Iphiva 3A and 6 respectively. The substation will accommodate three (2) 400 kV and seven (7) 132 kV powerlines entering / leaving the site in various directions¹. Construction of the substation will include:

- Vegetation clearing;
- Surface clearing, levelling and terracing;
- Laying of concrete foundations and other applicable works such as storm water drainage pipes, slabs, bund walls, control room and storage facilities;
- Erection of steelworks;
- Delivery and installations of transformers; and
- Upgrade of access roads, and where applicable, water crossings.

Based on the proposed activities, the Listed Activities as presented in **Error! Reference source not found.** will be triggered.

¹ The routing of the 400 and 132 kV lines will be determined based on the authorisation of the final siting of the Iphiva Substation at either the proposed Iphiva 3 or Iphiva 6 alternatives.



Table 1-1: Applicable Listed Activities relative to the Iphiva Substation

Listing Notice	Activity	Description
GN R 983 (as amended by GN R 327)	11	<p>The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV or (ii) inside urban areas or industrial complexes with a capacity of 275 kV or more excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is –</p> <ul style="list-style-type: none"> (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.
	14	<p>Development and related operation facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p>
	24	<p>The development of a road (ii) with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres.</p>
	28	<p>Institutional developments wherever such land was used for agriculture, game farming, equestrian purposes or afforestation after 1 April 1998, outside an urban area where the total land is bigger than 1 hectare.</p>
GN R 984 (as amended by GN R 325)	9	<p>The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is –</p> <ul style="list-style-type: none"> (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.



Listing Notice	Activity	Description
GN R 985 (As amended by GN R 324)	3	<p>The development of masts or towers of any type used for telecommunication broadcasting or radio transmission purposes where the mast or tower- (a) is to be placed on a site not previously used for this purpose; and (b) will exceed 15 meters in height – but excluding attachments to existing buildings and masts on rooftops. (d) In KwaZulu-Natal (ii) Community Conservation Areas; (iii) Biodiversity Stewardship Programme Biodiversity Agreement areas; (iv) A protected area identified in terms of NEMPAA, excluding conservancies; (vi) Sites or areas identified in terms of an International Convention; (vii) Critical Biodiversity areas as identified in systemic biodiversity plans adopted by the competent authority or bioregional plans; (viii) Core areas in Biosphere Reserves; (ix) Areas designated for conservation use in Spatial Development Frameworks adopted by competent authority or zoned for conservation purpose; (xi) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (xii) Outside urban areas (bb) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.</p>
	4	<p>Development of a road wider than 4 m with a reserve less than 13,5 metres. (d) In KwaZulu-Natal (iii) Community Conservation Areas; (v) Biodiversity Stewardship Programme Biodiversity Agreement areas; (vi) A protected area identified in terms of NEMPAA, excluding conservancies; (vii) Sites or areas identified in terms of an International Convention; (viii) Critical Biodiversity areas as identified in systemic biodiversity plans adopted by the competent authority or bioregional plans; (ix) Core areas in Biosphere Reserves; (x) Areas designated for conservation use in Spatial Development Frameworks adopted by competent authority or zoned for conservation purpose; (xi) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (xii) Outside urban areas (i) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.</p>
	12	<p>Clearance of an area of 300 m² or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance plan. In (d) KwaZulu-Natal: (ii) community conservation areas; (iv) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an areas that has been identified as critically endangered in</p>



Listing Notice	Activity	Description
		<p>the National Spatial Biodiversity Assessment 2004; (v) Critical biodiversity areas as identified is systemic biodiversity plans adopted by the competent authority or in bioregional plans; (vii) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; (viii) A protected area identified in terms of NEMPAA, excluding conservancies; (xi) Areas designated for conservation use in Spatial Development Frameworks adopted by competent authority or zoned for a conservation purpose; (xii) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p>



1.2.2 132 kV Distribution line alternatives

Eskom will at a later stage, submit an application for environmental authorisation for the establishment of 132 kV distribution powerlines as part of the greater Project. Therefore, these are being considered in this report to provide a holistic assessment of the potential avifaunal impacts to be considered as a condition of authorisation.

Eskom are considering six (6) 132 kV distribution powerlines. These will comprise the following routings:

- Iphiva – Pongola (1) 132 kV powerline to tie in with the existing powerline, double circuit with Iphiva / Hluhluwe;
- Iphiva – Pongola (2) 132 kV powerline;
- Iphiva / Makhathini 132 kV powerline double circuit with Iphiva / Mbazwane;
- 132 kV powerline loop-in to Candover Switching Station from the existing Impala / Normandie Line²

Eskom will apply for the environmental authorisation of 500 m corridors within which the 132 kV Distribution powerlines will occupy a 36 m wide servitude. The associated towers will be placed between roughly 250 – 400 m apart, ranging in heights between 25 – 40 m.

Construction of the 132 kV distribution powerlines will include:

- Establishment of a contractor site along the route alignments;
- Access road negotiation and construction;
- Survey and pegging of the tower positions;
- Fencing and gate installation;
- Vegetation clearing;
- Foundation excavation and installation;
- Tower assembly and erection;
- Conductor stringing and tensioning; and
- Servitude clean-up and rehabilitation.

Based on the proposed activities, the Listed Activities as presented in Table 1-2 will be triggered.

² This line is temporary and will be removed once the Iphiva Substation and new Iphiva / Normandie Line are commissioned.



Table 1-2: Applicable Listed Activities relating to the 132 kV Distribution Lines

Listing Notice	Activity	Description
GN R 983 (as amended by GN R 327)	11	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV or (ii) inside urban areas or industrial complexes with a capacity of 275 kV or more excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – <ul style="list-style-type: none"> (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.
	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from – (i) a watercourse.
	28	Institutional developments wherever such land was used for agriculture, game farming, equestrian purposes or afforestation after 1 April 1998, outside an urban area where the total land is bigger than 1 hectare.
	56	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre- (i) where the existing road reserve is 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 meters; excluding where widening or lengthening occur inside and urban area.
GN R 985 (As amended by GN R 324)	4	Development of a road wider than 4 m with a reserve less than 13,5 metres. (d) In KwaZulu-Natal (iii) Community Conservation Areas; (v) Biodiversity Stewardship Programme Biodiversity Agreement areas; (vi) A protected area identified in terms of NEMPAA, excluding conservancies; (vii) Sites or areas identified in terms of an International Convention; (viii) Critical Biodiversity areas as identified in systemic biodiversity plans adopted by the competent authority or bioregional plans; (ix) Core areas in Biosphere Reserves; (x) Areas designated for conservation use in Spatial Development Frameworks adopted by competent



Listing Notice	Activity	Description
		authority or zoned for conservation purpose; (xi) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (xii) Outside urban areas (i) Areas within 10 kilometres from national parks or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.

1.2.3 Iphiva-Duma 400 kV (Ref. No. 14/12/16/3/3/2/1038)

The Iphiva – Duma 400 kV powerline will extend over a 130 km routing in the southern portion of the overall study area. Three technically feasible alternative routing options were considered in this assessment, namely the eastern, west 1 and west 2 corridors. The overhead powerline will be supported by towers positioned within a 55 m servitude³. Possible tower types⁴ that may be considered for this Project include:

- Cross rope;
- Self-supporting; and
- Guyed vee.

Construction of the powerline will include:

- Establishment of a contractor site along the route alignment;
- Access road negotiation and construction;
- Survey and pegging of the tower positions;
- Fencing and gate installation;
- Vegetation clearing;
- Foundation excavation and installation;
- Tower assembly and erection;
- Conductor stringing and tensioning; and
- Servitude clean-up and rehabilitation.

³ The servitude will allow for clearance of 27.5 m on either side of the centre line of the powerline. Where constructed in parallel, a minimum distance of 55 m between the centre points is required. The minimum vertical clearance distance between the ground and powerline conductor is 8.1 m.

⁴ Eskom will determine the tower type after establishing the final routing alignment and associated profiling with the necessary environmental authorisations. Please refer to the Scoping Report and EIA for detailed descriptions of the various tower types.



Eskom will require contractors' construction camps along the routing of the powerline during construction activities. The proponent will determine and negotiate the exact position of these with the relevant landowners after issuing of environmental authorisation of the final alignment. As far as possible, contractors will use the existing road network. Where the national regulatory framework requires additional authorisations for the construction of new roads, these will be included within the Environmental Management Programme (EMPr) as a condition of authorisation and obtained during the implementation phase prior to construction of the relevant Project component. Eskom will negotiate the various access points and road alignments the relevant landowners after issuing of environmental authorisation of the final alignment.

The individual towers will be placed on foundations. The type of foundation required however, is dependent on the geo-technical conditions of the final siting and the type of tower used. The foundations may be drilled, mechanically excavated or dug by hand, and filled with concrete. Any incomplete excavations will be protected to prevent injury of both animals and individuals, but will ultimately be back-filled and stabilised through compaction and capped with concrete.

The contractors will assemble the towers on site and lift it into place using cranes, or where required, helicopters. The conductors are then strung between the towers by lacing cable drums at 5 km intervals and passing the cables via guide wire through the desired position in 2.5 km intervals in each direction.

During operation, Eskom will undertake ongoing monitoring and maintenance in accordance with their "Life Cycle Management Plan for Transmission Overhead Lines" (Ref: TBP41-367).

Based on the proposed activities, the Listed Activities as presented in Table 1-3 will be triggered.


Table 1-3: Applicable Listed Activities relative to the Iphiva – Duma 400 kV

Listing Notice	Activity	Description
GN R 983 (as amended by GN R 327)	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from – (i) a watercourse.
	24	The development of a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road which is identified and included in activity 27 in Listing Notice 2 of 2014; where the entire road falls within an urban area; or which is 1 kilometre or shorter.
	28	Institutional developments wherever such land was used for agriculture, game farming, equestrian purposes or afforestation after 1 April 1998, outside an urban area where the total land is bigger than 1 ha.
	56	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre- (i) where the existing road reserve is 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 meters; excluding where widening or lengthening occur inside and urban area.
GN R 984 (as amended by GN R 325)	9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.
GN R 985 (As amended by GN R 324)	4	Development of a road wider than 4 m with a reserve less than 13,5 metres. (d) In KwaZulu-Natal (iii) Community Conservation Areas; (v) Biodiversity Stewardship Programme Biodiversity Agreement areas; (vi) A protected area identified in terms of NEMPAA, excluding conservancies; (vii) Sites or areas identified in terms of an International Convention; (viii) Critical Biodiversity areas as identified in systemic biodiversity plans adopted by the competent authority or bioregional plans; (ix) Core areas in Biosphere Reserves; (x) Areas designated for conservation use in Spatial Development Frameworks adopted by



Listing Notice	Activity	Description
		competent authority or zoned for conservation purpose; (xi) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (xii) Outside urban areas (i) Areas within 10 kilometres from national parks or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.
	12	Clearance of an area of 300 m ² or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance plan. In (d) KwaZulu-Natal: (ii) community conservation areas; (iv) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an areas that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (v) Critical biodiversity areas as identified is systemic biodiversity plans adopted by the competent authority or in bioregional plans; (vii) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; (viii) A protected area identified in terms of NEMPAA, excluding conservancies; (xi) Areas designated for conservation use in Spatial Development Frameworks adopted by competent authority or zoned for a conservation purpose; (xii) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.

1.2.4 Normandie-Iphiva 400 kV (Ref. No. 14/12/16/3/3/2/1036)

The Normandie – Iphiva 400 kV powerline will extend over an approximate 150 km routing in the northern portion of the overall study area. Eskom considered the results of the scoping assessment, discarding routing options with significant sensitivities. The remaining N-I 2 and N-I 3 alternative routing options were considered in this assessment. The construction and operational activities, as presented in Section 1.2.3 above, are applicable to this component of the Project. These are not repeated here for the sake of brevity.

Please refer to Table 1-3 for applicable listed activities for the Normandie-Iphiva 400 kV powerline EA application.

1.3 Project Location

The proposed project is located predominately in KZN with a small portion of the project extending into Mpumalanga. The Umkhanyakude, Zululand and Gert Sibande District Municipalities are affected by the project with Pongola and Mkuze being the main towns in the study area. Land use varies across the study area with dispersed rural settlements,



sugar cane farming, areas formally protected for conservation, private game farms and linear peri-urban development adjacent to the National Route 2 (N2). The Pongola River divides the area north and south and one of the lines will have to cross it (Figure 1-1). Also indicated on this map are the names used to refer to different route options, these different options form the basis for the sensitivity assessment.

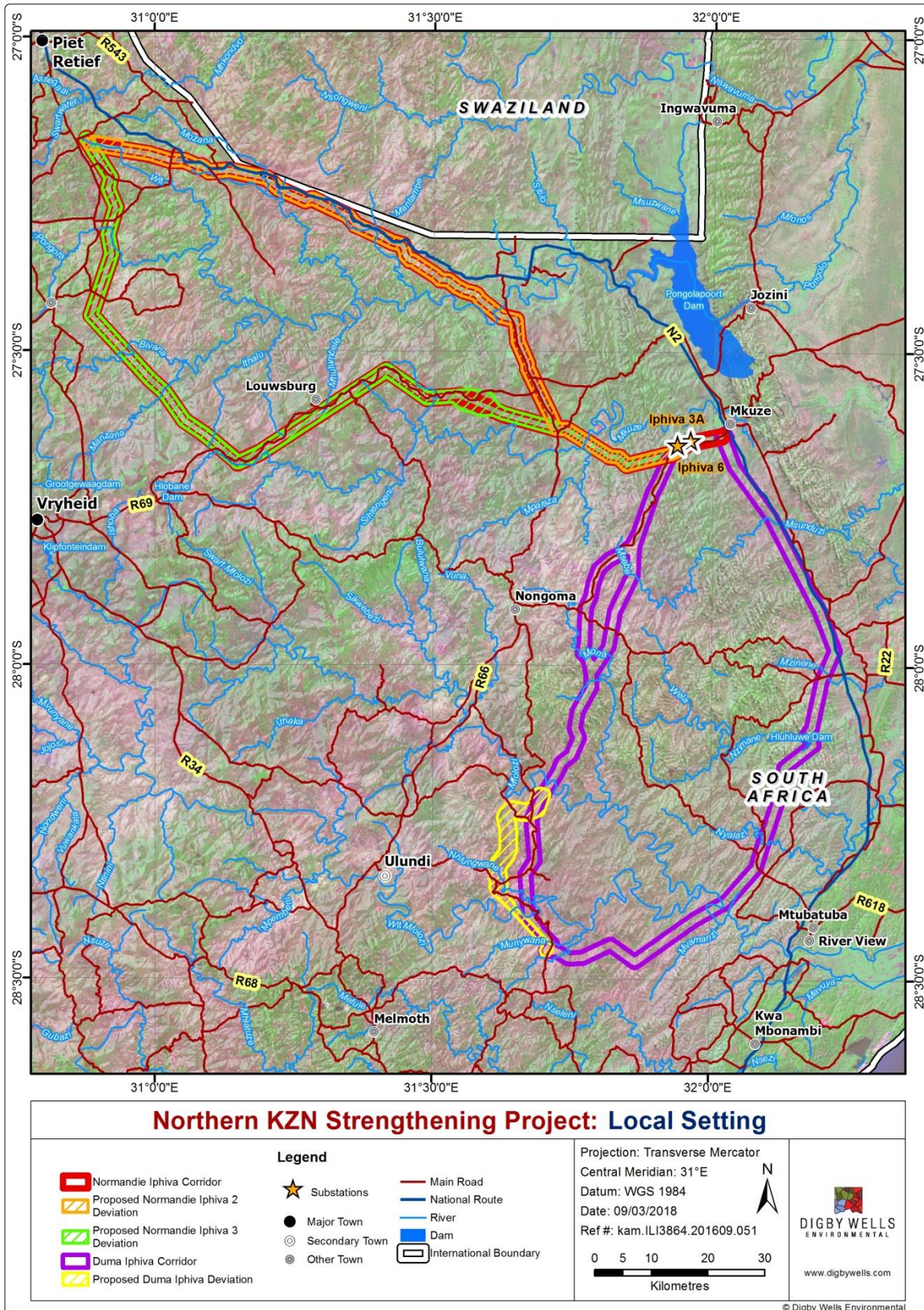


Figure 1-1: Project Location



1.4 Terms of Reference

The Terms of Reference of this avifauna screening and comparative specialist study was to evaluate the presence of sensitive avifauna species and landscapes/habitat present that could be affected by the various options available for the project infrastructure. Thereafter to determine the preliminary impacts on these natural resources and recommend mitigation measures to alleviate negative impacts.

1.5 Scope of Work

The avifauna specialist study and comparative screening assessment was completed through the following activities:

- Completion of a desktop assessment to determine the baseline of the avifauna species present in the study area;
- Identification of likely impacts on the natural species and landscape through project activities proposed;
- Present the results of consultation with Interested and Affected Parties (I&APs) and/or stakeholders; and
- Recommend feasible management or mitigation measures to avoid and/or reduce negative impacts and enhance positive ones.

1.6 Expertise of Specialist

Phil Patton (Pr.Sci.Nat.) is a High Conservation Value (HCV) accredited assessor in Ornithology and is the Manager of the Biophysical Department at Digby Wells. He holds a B.Sc Hons (EGS) from the University of Cape Town, and a B.Sc (Geology and Geography & Environmental Management) from the University of Port Elizabeth. He is an experienced Ornithologist, having recently completed major avifaunal surveys in Southern Africa and previously unsurveyed areas in the Democratic Republic of Congo. Phil has been registered as a Professional Natural Scientist since 2012 and has over 17 years of consulting experience in ecological assessments and environmental auditing within the mining, and other similar industries. He has ornithological working experience across Africa, Asia, Europe and the Middle East.

2 Legislative and Policy Framework

The surveys and reporting for Eskom's Northern KZN strengthening project was completed in accordance with the following legislation and guideline documents:

- Section 24 of the Constitution – Environment, 1996 (Act No. 108 of 1996);
- Section 5 of the National Environmental Management Act, 1998 (Act No. 108 of 1998);



- National Environmental Management Biodiversity Act, 2004 (NEMBA, Act No. 10 of 2004); and
- Guidelines for Biodiversity Impact Assessments in KZN, 2003 (February 2013, Ezemvelo KZN Wildlife).
- International Union for the Conservation of Nature (IUCN) Red List (IUCNRedList.org 2016-2); and
- The National Environmental Biodiversity Act, 2004 (Act 10 of 2004), Threatened and Protected Species.

3 Limitations

The avifaunal specialist study was completed during the rainy season (November) of KwaZulu-Natal, and as such during 3 of the 7 days on site field work was hampered by rain, flooded river crossings and low visibility.

- The assessment constitutes a high-level screening to identify the potential impacts to avifauna that may be present within the approved corridors and development footprints. This report is not a reflection of the avifauna currently present in the development footprints as can be reported upon thorough detailed infield investigations;
- The development footprint of the various infrastructures will be finalised upon selection and authorisation of the preferred options and corridors. To this effect, a detailed impact assessment on all project infrastructure areas, could not be completed in this report, and further assessments to confirm placement of electricity towers and mitigation measures in sensitive areas, must be completed during implementation;
- Considering the nature of the project, the extent of the routing options, and scope of work, the field survey was predominantly undertaken as a vehicular survey, except with regards to the substations and distribution line alternatives;
- While every effort was made to cover the extent of the various routing options, access to portions of various routing options was restricted by topography and landowners; and
- Whilst every attempt to obtain the latest available information was made, the reviewed literature does not represent an exhaustive list of information sources for the various study areas.

4 Methodology

The field screenings completed, aimed to identify the preferred corridor in which the proposed powerline will be situated. The avifauna survey evaluated both of the substation sites and 132 kV distribution lines in detail, however, with regards to the 400 kV powerline

corridors field work was limited to selected areas of concern, with the remaining based on desktop information.

This specialist study will aim for authorisation of corridors (approximately 2km wide) within which a servitude (55 m) for the power lines can be acquired. The approach of this study is to avoid environmental impacts by identifying a corridor for each power line within which the power line can be constructed that will have the least impacts on the avifaunal environment. The acquisition of the servitudes and identification of the power line positions will only be undertaken after Environmental Authorisation (EA) has been received. The EA will therefore be obtained without doing detailed ground surveys of the full corridors. Further studies will be required during implementation phase in the form of a detailed walk down.

4.1 Avifaunal Survey

In predicting the impacts of a proposed project on avifauna requires a series of investigations and understanding on the density, diversity and type of species found in the proposed project area. More specifically the methodology used to predict impacts in the current study is as follows:

- Data from a desktop level will be examined to determine the location and abundance of Avifauna sensitive to transmission lines in the study area;
- A desktop examination, using GIS imagery was done to compare the alternatives;
- The substations and distribution line areas were visited in the late summer month of March, and thoroughly traversed by vehicle and on foot to obtain a first-hand understanding of the proposed routes, habitat and presence of avifauna, and to determine which bird micro-habitats are present and relevant to the study. This involved driving the study area, taking photographs, and walking certain accessible areas, to see as much as possible of the proposed routes for the power lines;
- The impacts of the proposed power lines on avifauna will be predicted on the basis of experience in gathering and analysing data on avifaunal impacts with power lines; and
- Recommended mitigation measures for significant impacts will be proposed.

4.2 Consideration of alternatives

The use of multi-criteria decision analysis (MCDA) has proven to be a quantifiable and defensible method when assessing the suitability of various alternative decision options. The matrix used in this instance adopts a specific variant of MCDA, the Simple Linear Additive Evaluation Model (SLAEM). This model yields a single, overall value for each decision option that reflects the rating on each of the decision criteria under consideration. The SLAEM has a well-established record of providing robust and effective support to decision makers when considering the suitability of various decision options.



Digby Wells developed specific evaluation criteria that assess decision options suitability from the perspective of specialist disciplines. These criteria denote characteristics that would influence the selection through the severity of identified potential impacts relevant to the specialist disciplines or project-related risks. A clear understanding of the baseline conditions, therefore, is critical to identifying criteria that are relevant to the evaluation.

Digby Wells assessed the various alternative options in terms of the defined evaluation criteria to assign a rating. Rating options range from 5 (most suitable) to 1 (unsuitable). This method employed a "rounded average" of the criteria value to allow for comparison between various specialist disciplines regardless of the number of criteria used. In this way, an overall ranking of between 1 and 5 can be obtained.

5 Baseline Avifaunal Description

The project area falls within the northern section of Kwa Zulu Natal is well known for its large wetlands, river systems, grassland hills, bushveld and diverse micro-habitats. A total of 58 of Southern Africa's endemic and near endemic avifaunal species are found within the project area, many of them confined to the extensive grassland, riparian and wetland systems. Although the summer months are more productive for the diversity of species due to the arrival of breeding migrants, winter provides large congregations of water birds around some of the nationally important wetlands found within the project area.

The site falls within the Maputaland-Pondoland Centre of Endemism, which is a biodiversity hotspot. There are four Important Bird Areas (IBAs) within the current proposed routes namely, the Ithala Game Reserve, Hluhluwe – Umfolozi National Park, Pongola Nature Reserve and the Mkuze Game Reserve which forms part of the Isimangaliso Wetland Park (Figure 7-5). Collectively these IBAs would constitute some of the most avifaunal rich and diverse areas in South Africa. Many of the areas outside these IBAs will have similar habitat and species will not be restricted to the protected areas.

Ithala Game Reserve is located 15 km from Louwsburg in open grassland hills south of the Pongola River. This IBA is known to support more than 300 bird species, a diversity that can be attributed to its variety of habitat it supports. Among these are a number of large, wide-ranging species that have suffered considerably outside extensive protected areas. The higher altitude areas contain a colony of Southern Bald Ibis (*Geronticus calvus*), Blue Crane (*Anthropoides paradiseus*) and several large bird of prey species including the critically endangered White-backed Vulture (*Gyps africanus*), Lappet-faced Vulture (*Torgos tracheliotos*), Martial Eagle (*Polemaetus bellicosus*), Bateleur (*Terathopius ecaudatus*) and Tawny Eagle (*Aquila rapax*). African Grass Owl (*Tyto capensis*) occurs in the grassland areas. (Birdlife.org.za)

The Pongola Nature Reserve IBA is located 30 km south-east of Pongola town. The Pongola River flows in from the north-west and only a small section of the river lies inside the reserve. The vegetation predominantly consists of Zululand Lowveld (Mucina and Rutherford, 2006). The associated wetlands are important for wetland-dependent birds such as the Pink-backed Pelican (*Pelecanus rufescens*) which has bred in the past, making this one of only two sites



in South Africa where it does so. Globally threatened species include the endangered vulture species such as Lappet-faced Vulture (*Torgos tracheliotos*), White-headed Vulture (*Trigonoceps occipitalis*), White-backed Vulture (*Gyps africanus*) and Martial Eagle (*Polemaetus bellicosus*). Regionally threatened species are Marabou Stork (*Leptoptilos crumeniferus*), African Marsh Harrier, African Grass Owl (*Tyto capensis*) and Tawny Eagle. Biome-restricted species include White-throated Robin-Chat (*Irania gutturalis*), Gorgeous Bush-Shrike (*Telophorus viridis*) and Rudd's Apalis (*Apalis ruddi*).

Various sensitivity zones have been identified on a desktop level, associated with protected areas and IBAs, including: pristine or secondary grassland, bushveld and sand forest, wetlands and rivers. This will help to identify the areas to mitigate for bird collisions, once the final route is chosen. The desktop specialist study shows bird sensitive areas to be widespread throughout the study area, but with greater density in the southern and eastern areas.

The Mkuze IBA is located on the western edge of the Isimangaliso Wetland Park which is both a Ramsar Site and a world Heritage Site. It is here a number of large pan systems exist and therefore home to a number of wetland and aquatic species. There are important water courses and wetlands that are associated with the river systems in the central and southern region of the study area, as well as in the east within the Mkuze Game Reserve. These wetlands may well be seasonal but occasionally inundated with water and associated with the "Subtropical Alluvial Vegetation" vegetation type (Mucina & Rutherford 2006). The larger rivers and associated sandbanks provide habitat for various wading species including, Lapwings, Plovers, Stilts, and Sandpipers. Rivers and drainage lines also represent important flight paths for many species. These areas will be very important for assorted water bird species, and construction of the new power line in close proximity to these areas should be avoided.

The Hluhluwe–Umfolozzi IBA lies 20 km north-west of the town Mtubatuba, at the junction of the coastal plain and the foothills of the KwaZulu-Natal interior. The local vegetation is classified as Zululand Lowveld and Northern Zululand Thornveld (Mucina and Rutherford, 2006). This region to the south of the proposed project area is known to support more than 400 bird species, about 46% of the species found in the southern African sub-region (birdlife.org.za). The bird diversity within the region can be attributed to the variety of habitats in this area. This diversity includes a number of important populations of large, widespread birds that have suffered outside extensive protected areas.

Large terrestrial species found here and are susceptible to power line collisions include Black Stork (*Ciconia nigra*), Woolly-necked Stork (*C. episcopus*), African Openbill (*Anastomus lamelligerus*) and Saddle-billed Stork (*Ephippiorhynchus senegalensis*). Several endangered vulture species that are rare outside South Africa's large parks are locally common here.

A list of the potential species associated with the entire region is presented in Appendix A. During the field visit this species list will be fine-tuned depending on observations and habitats associated with the proposed project. The South African Bird Atlas Project data



(SABAP2) recorded a total of 27 Red Data species according to the International Union for Conservation of Nature (IUCN, 2016), comprising 3 Endangered, 9 Vulnerable and 13 Near-threatened.

Table 5-1: Potential Red Data (IUCN) Bird Species associated with the project area

Common Name	Scientific name	IUCN Status
Maccoa Duck	<i>Oxyura maccoa</i>	Near-threatened
Lesser Flamingo	<i>Phoeniconaias minor</i>	Near-threatened
Grey Crowned Crane	<i>Balearica regulorum</i>	Endangered
Wattled Crane	<i>Bugeranus carunculatus</i>	Vulnerable
Blue Crane	<i>Grus paradisea</i>	Vulnerable
Kori Bustard	<i>Ardeotis kori</i>	Near-threatened
Slaty Egret	<i>Egretta vinaceigula</i>	Vulnerable
Chestnut-banded Plover	<i>Charadrius pallidus</i>	Near-threatened
Black-winged Pratincole	<i>Glareola nordmanni</i>	Near-threatened
African Skimmer	<i>Rynchops flavirostris</i>	Near-threatened
Bateleur	<i>Terathopius ecaudatus</i>	Near-threatened
Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	Near-threatened
White-headed Vulture	<i>Trigonoceps occipitalis</i>	Critically Endangered
Hooded Vulture	<i>Necrosyrtes monachus</i>	Critically Endangered
White-backed Vulture	<i>Gyps africanus</i>	Critically Endangered
Cape Vulture	<i>Gyps coprotheres</i>	Endangered
Lappet Faced Vulture	<i>Torgos tracheliotos</i>	Endangered
Black Harrier	<i>Circus maurus</i>	Vulnerable
Pallid Harrier	<i>Circus macrourus</i>	Near-threatened
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable
Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	Vulnerable



European Roller	<i>Coracias garrulus</i>	Near-threatened
Red-footed Falcon	<i>Falco vespertinus</i>	Near-threatened
Sooty Falcon	<i>Falco concolor</i>	Near-threatened
Neergaard's Sunbird	<i>Cinnyris neergaardi</i>	Near-threatened
Yellow-breasted Pipit	<i>Hemimacronyx chloris</i>	Vulnerable
Melodious Lark	<i>Mirafra cheniana</i>	Near-threatened
Bush Blackcap	<i>Lioptilus nigricapillus</i>	Near-threatened



5.1 Site Investigation

5.1.1 Project activities

The proposed project consists of the new Iphiva 400/132 kV substation near the town of Mkuze in KwaZulu-Natal, which will be integrated into the 400 kV network by two 400 kV lines, namely the 120 km Normandie-Iphiva, the 130 km Duma-Iphiva 400 kV lines 165 km of 132 kV Distribution powerlines will also link into the Iphiva substation. The size of the substation is 24 ha.

For the 132 kV distribution power lines, the height of the tower will be approximately 18-25m and tower spacing is approximately 200 - 250m. Six 132 kV power lines of varying lengths will exit the proposed Iphiva 400/132 kV substation totalling a combined distance of 165 km. These lines will feed into the existing and proposed 132 kV infrastructure within the vicinity of the proposed Iphiva 400/132 kV substation for a radius of approximately 25 km. The EIA will assess 2 km wide corridors for each line, within which 36 m wide servitude will be negotiated by Eskom during the implementation of the project. A consideration is that, due to spatial constraints, two power lines may be combined on a single set of structures where necessary and technically feasible. An eighth spare 132 kV feeder bay will be allowed for in the substation to make allowance for a potentially eighth 132 kV line should it be required, to exit the substation.

5.2 Findings

Birds were recorded at several specific sampling points including the proposed substation areas in detail as well as throughout the site. Points were chosen near water (river or dam) points, rocky outcrops as well as in areas of each vegetation type as described by the vegetation assessment. Any opportunistic sightings were also recorded. A total number of 144 species were directly observed during the screening survey and are reflected in Appendix 1 in bold.

5.3 Potential Impacts Identified

The following potential impacts to avifauna were identified:

5.3.1 Electrocutions

The electrocution of birds on overhead lines is a significant cause of unnatural mortality of a number of different bird species including birds of prey and large terrestrial birds in a Southern African context. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). Electrocution is possible on a 132 kV power line, especially where large raptors and vultures feature prevalently (Table 5-2), (Figure 5-1). Unfortunately, it is likely that vultures will occur in high numbers in the study area as well as numerous large eagles, ibises, storks and other birds of prey, so the impact of electrocution is likely to be of High



Significance across all alternatives for the proposed power line, including the preferred alternative.

Table 5-2: Birds of prey identified within the project area

Common Name	Scientific name	IUCN Status
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable
Black-shouldered Kite	<i>Elanus caeruleus</i>	Least concern
African Harrier Hawk	<i>Polyboroides typus</i>	Least concern
Bateleur	<i>Terathopius ecaudatus</i>	Near-threatened
Black-chested Snake Eagle	<i>Circaetus pectoralis</i>	Least concern
Brown Snake Eagle	<i>Circaetus cinereus</i>	Least concern
White-headed Vulture	<i>Trigonoceps occipitalis</i>	Critically Endangered
White-backed Vulture	<i>Gyps africanus</i>	Critically Endangered
Cape Vulture	<i>Gyps coprotheres</i>	Endangered
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	Endangered
Martial Eagle	<i>Polemaetus bellicosus</i>	Vulnerable
Long-crested Eagle	<i>Lophaetus occipitalis</i>	Least concern
African Hawk Eagle	<i>Aquila spilogaster</i>	Least concern
Wahlberg's Eagle	<i>Hieraaetus wahlbergi</i>	Least concern
African Marsh Harrier	<i>Circus ranivorus</i>	Vulnerable in SA
Black Harrier	<i>Circus maurus</i>	Vulnerable
Amur Falcon	<i>Falco amurensis</i>	Least concern
Little-banded Goshawk	<i>Accipiter badius</i>	Least concern
Lanner Falcon	<i>Falco biarmicus</i>	Vulnerable in SA
African Fish Eagle	<i>Haliaeetus vocifer</i>	Least concern



Black Kite	<i>Milvus migrans</i>	Least concern
Jackal Buzzard	<i>Buteo rufofuscus</i>	Least concern
Steppe Buzzard	<i>Buteo buteo</i>	Least concern
Pearl-spotted Owlet	<i>Glaucidium perlatum</i>	Least concern
Common Barn Owl	<i>Tyto alba</i>	Least concern



Figure 5-1: Bateleur Eagle (*Terathopius ecaudatus*), Brown Snake Eagle (*Circaetus cinereus*) and Amur Falcon (*Falco amurensis*)

The impacts that are expected with the proposed new powerline(s) depend on the diversity and density of bird species present. Species based on their behaviour, physical structure, size and habitat preferences will be vulnerable to different impacts. For example, birds that perch on the pylons and wires of large powerlines would be more susceptible to electrocution while those species that fly in large flocks such as some waterfowl are vulnerable to collisions along areas within their preferred flight paths such as within river or valley systems. The Avifauna SSC that will be affected by the project, per QDS in displayed in Table 5-3 below.

Table 5-3: The number of bird species present within selected grids within the project area according to SABAP (Harrison et al, 2016)

Grids	Area	No. species in grid square	No. Red Data species	No. of species interacting with powerlines
2731DB	Mkuzi	432	23	43
2831BB	Hluhluwe - Umfolozi	381	16	38



2731CB	Ithala	367	18	37
2730BD	Paulpietersburg	212	8	28

5.3.2 Collisions

Collisions are the biggest single threat posed by over-head power lines to birds in southern Africa (Van Rooyen 2004). In general, large lines with earth wires that are not always visible to birds can have the largest impact in terms of collisions. Most heavily impacted upon are korhaans, 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). Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. The Red Data, rare and endemic species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. There are a few exceptions to this with the likes of some of the lark and pipit species. 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 results 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. Collision of certain large flying bird species such as Great White Pelican (*Pelecanus onocrotalus*), Pink-backed Pelican (*Pelecanus rufescens*), and Saddle-billed Stork (*Ephippiorhynchus senegalensis*), Yellow-billed Stork (*Mycteria ibis*), Woolly-necked Stork (*Ciconia episcopus*), Lesser Flamingo (*Phoenicopterus minor*), Black-bellied Bustard (*Lissotis melanogaster*), and Secretarybird (*Sagittarius serpentarius*) and the three crane species, with the proposed lines is a possibility.

A number of species of special concern are regarded as being of high collision threat including African Pygmy Goose (*Nettapus auritus*), Southern Ground Hornbill (*Bucorvus leadbeateri*), Hooded Vulture (*Necrosyrtes monachus*), Bateleur (*Terathopius ecaudatus*), African Marsh Harrier (*Circus ranivorus*) and Black Harrier (*Circus maurus*) (Table 5-3) (Figure 5-2).



Table 5-4: Water and large terrestrial birds identified in the project area (please refer to avifaunal plan)

Common Name and family	Scientific name	IUCN Status
White-faced Whistling Duck	<i>Dendrocygna viduata</i>	Least concern
Egyptian Goose	<i>Alopochen aegyptiaca</i>	Least concern
South African Shelduck	<i>Tadorna cana</i>	Least concern
African Black Duck	<i>Anas sparsa</i>	Least concern
Yellow-billed Duck	<i>Anas undulata</i>	Least concern
Spur-winged Goose	<i>Plectropterus gambensis</i>	Least concern
Red-knobbed Coot	<i>Fulica cristata</i>	Least concern
Blue Crane	<i>Grus paradisea</i>	Vulnerable
Red-crested Bustard	<i>Lophotis ruficrista</i>	Least concern
European White Stork	<i>Ciconia ciconia</i>	Decreasing in SA
Saddle-bill Stork	<i>Ephipiorhynchus senegalensis</i>	Vulnerable in SA
Hamerkop	<i>Scopus umbretta</i>	Least concern
Cattle Egret	<i>Bubulcus ibis</i>	Least concern
Grey Heron	<i>Ardea cinerea</i>	Least concern
Black-headed Heron	<i>Ardea melanocephala</i>	Least concern
Goliath Heron	<i>Ardea goliath</i>	Least concern
African Spoonbill	<i>Platalea alba</i>	Least concern
Hadedda Ibis	<i>Bostrychia hagedash</i>	Least concern
Reed Cormorant	<i>Microcarbo africanus</i>	Least concern
African Darter	<i>Anhinga rufa</i>	Least concern
Black-winged Stilt	<i>Himantopus himantopus</i>	Least concern
Three-banded Plover	<i>Charadrius tricollaris</i>	Least concern



Blacksmith Lapwing	<i>Vanellus armatus</i>	Least concern
African Jacana	<i>Actophilornis africanus</i>	Least concern
Green Sandpiper	<i>Tringa ochropus</i>	Rare/Accidental
Wood Sandpiper	<i>Tringa glareola</i>	Least concern



Figure 5-2: White Stork (*Ciconia ciconia*) observed along the northern route near Paulpietersburg

5.3.3 Habitat destruction

During the construction phase of the power lines some habitat clearing and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of servitudes, as well as clearing vegetation at the substation site. 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.

5.3.4 Disturbance

Similarly, the above mentioned construction and maintenance activities impact on birds through disturbance, particularly during bird breeding activities. Uncontrolled vehicle access can result in unnecessary loss of indigenous and riparian vegetation and preferred habitat for breeding bird species such as lark, pipit, lapwing, courser and bustard species.

6 Preliminary Impact Assessment

6.1 Methodology

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.



The significance rating process follows the established impact/risk assessment formula:

$$\text{Significance} = \text{Consequence} \times \text{Probability} \times \text{Nature}$$

Where

$$\text{Consequence} = \text{Intensity} + \text{Extent} + \text{Duration}$$

And

$$\text{Probability} = \text{Likelihood of an impact occurring}$$

And

$$\text{Nature} = \text{Positive (+1) or negative (-1) impact}$$

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 6-3. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 6-2, which is extracted from Table 6-1. The description of the significance ratings is discussed in Table 6-3.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 6-1: Impact Assessment Parameter Ratings

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and/or social benefits which have improved the overall conditions of the baseline.	<u>International</u> The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	<u>National</u> Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain/Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	<u>Province/ Region</u> Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures/items of cultural significance.	Average to intense natural and/or social benefits to some elements of the baseline.	<u>Municipal Area</u> Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	<u>Local</u> Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	<u>Limited</u> Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare/improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	<u>Very limited/Isolated</u> Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely/None: Expected never to happen. <1% probability.

Table 6-2: Probability/Consequence Matrix

		Significance																																					
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					


Table 6-3: Significance Rating Description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and/or social environment.	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and/or social environment.	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and/or social environment.	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and/or social environment.	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe changes.	Moderate (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)



6.2 Iphiva Substation 3 (Ref. No. 14/12/16/3/3/2/1037)

6.2.1 Project Activity: Construction of Surface Infrastructure

The construction of various surface infrastructure components will mean the removal, partial or complete of habitat types present and the loss of avifaunal species of special concern (protected species), due to collision or electrocution.

Table 6-4: Interactions and Impacts of Iphiva Substation 3 and 6 Infrastructure Considered

Interaction	Impact
Site clearing and infrastructure construction.	Direct loss of habitat types and biodiversity.
	Loss of Avifaunal species of special concern (protected species), due to collision or electrocution.

6.2.1.1 Impact Description

The construction of surface infrastructure which will include access roads and the actual sub-station will affect the current habitat types present. A 400 x 400 m (i.e. 16 ha) will be required for the development footprint, within a site-specific study area of 1 x 1 km. The 16 ha development footprint area includes provisions for an 80 m high microwave radio communication mast, oil and fuel storage facilities, and an oil bund to contain any accidental transformer oil spills.

With the clearing of vegetation, habitat will be removed; here indigenous vegetation will be replaced by fast growing alien and weed vegetation, degrading the general habitat quality. The construction of infrastructure especially at height, which includes distribution lines emanating from the substation will pose a risk to avifaunal species in the form of collision and electrocution risk.

6.2.1.2 Management Objectives

Management objectives will be to prevent the loss of important/protected Avifaunal, species specifically those with Red Data Status, National and Provincial. To achieve this objective, the mitigation measures proposed in this report must be implemented.

High structures, such as the radio tower pose a risk of collision, and suitable measures must be applied to make the mast visible to birds, the same principle applies to electrical infrastructure but these have the added risk of electrocution.



The destruction of the habitat/vegetative cover must be limited, this can be achieved by restricting the removal and disturbance of vegetation to those areas absolutely essential for the infrastructure placements.

6.2.1.3 Management Actions and Targets

Known Protected and Red Data status bird nesting, foraging and dispersion areas must be avoided. This can be achieved by incorporating provincial government and other existing databases into this report.

Applying the mitigation hierarchy is essential to aligning the project to best practice. Therefore the avoidance of any red data species and their nesting and foraging areas is essential.

As for habitat present in the substation area, the destruction of vegetation should be limited to the areas essential for the development if construction is finalised the environmental officer must ensure the construction areas are rehabilitated. Areas of erosion must be marked and attended to before the following wet season starts.

Rehabilitation of disturbed areas should take place within a week of construction, all bare patches of soil should be vegetated, preferably with indigenous pioneer species which will colonise open and disturbed areas relatively quickly, and prevent erosion and alien vegetation establishing.

6.2.1.4 Impact Ratings

Table 6-5: Potential Impacts of Construction of the Iphiva 3 Substation Infrastructure

Activity and Interaction: Construction of infrastructure requires habitat clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Direct loss of habitat types and biodiversity			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	A permanent and total loss of 16 ha of habitat will occur.	Moderate (negative) – 91
Extent	Limited (2)	Species/habitat loss will only occur within and immediately around the project site.	
Intensity x type of impact	Serious (4)	The footprint of Iphiva 3 covers undisturbed grassland, which may provide habitat to protected species.	



Activity and Interaction: Construction of infrastructure requires habitat clearing			
Dimension	Rating	Motivation	Significance
Probability	Definite (7)	It is likely that destruction of habitat will occur where construction is completed.	
Nature	Negative		
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post- mitigation			
Duration	Permanent (7)	No mitigation possible.	
Extent	Limited (2)	If contractors adhere to mitigation such as to limit the footprint of disturbance to only essential areas.	



Activity and Interaction: Construction of infrastructure requires habitat clearing			
Dimension	Rating	Motivation	Significance
Intensity x type of impact	Moderate (-2)	Dependent on sensitivity of the specific site.	
Probability	Definite (7)	This impact will occur	
Nature	Negative		

Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Loss of species of special concern (protected species)			
<i>Prior to mitigation/ management</i>			
Duration	Project Life (5)	The potential for collisions and electrocution will be for the life of the project.	Moderate (negative) – 78
Extent	Municipal area (4)	Species/habitat loss will only occur within the project site, which is linear and stretches across the region.	
Intensity x type of impact	High (4)	The home ranges of protected bird species coincide with this route.	
Probability	High (6)	It is likely that loss of species due to collisions will occur.	
Nature	Negative		
<i>Mitigation/ Management actions</i>			
<ul style="list-style-type: none"> A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close 			



Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
<p>proximity to the towers.</p> <ul style="list-style-type: none"> ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post management			
Duration	Project Life (5)	The potential for collisions and electrocution will be for the life of the project.	Minor (negative) – 72
Extent	Local (3)	Bird/ power station interactions can be limited with mitigation measures	
Intensity x type of impact	High (4)	The home ranges of protected bird species coincide with this substation.	
Probability	High (6)	It is likely that loss of species due to collisions will occur.	
Nature	Negative		



Table 6-6: Potential Impacts of Construction of the Iphiva 6 Substation Infrastructure

Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Direct loss of habitat types and biodiversity			
<i>Prior to mitigation/ management</i>			
Duration	Project Life (5)	Total loss of 16 ha of habitat will occur.	Minor (negative) – 70
Extent	Limited (2)	Species/habitat loss will only occur within and immediately around the project site.	
Intensity x type of impact	Moderate(3)	The footprint of Iphiva 6 covers disturbed grassland habitat and agricultural areas.	
Probability	Definite (7)	It is likely that total destruction of vegetation types will occur.	
Nature	Negative		
<i>Mitigation/ Management actions</i>			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures 			



Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
<p>that increase the visibility of the powerline should be instituted.</p> <ul style="list-style-type: none"> Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post- mitigation			
Duration	Project Life (5)	Total loss of 16 ha of degraded habitat will occur.	Minor (negative) – 69
Extent	Limited (2)	Mitigation measures can alleviate this impact.	
Intensity x type of impact	Moderate(2)	Dependent on sensitivity of the specific site.	
Probability	Definite (7)	This impact will occur	
Nature	Negative		

Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Loss of species of special concern (protected species)			
Prior to mitigation/ management			
Duration	Project Life (5)	Infrastructure will be permanent.	Minor (negative) – 59
Extent	Limited (2)	Species loss will only occur within and immediately around the project site.	



Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
Intensity x type of impact	Moderate(3)	The footprint of Iphiva 6 covers disturbed grassland habitat and agricultural areas.	
Probability	Definite (7)	It is likely that protected bird species could be affected.	
Nature	Negative		
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post management			
Duration	Medium term (3)	With vegetation management including rehabilitation, vegetation	Negligible (negative) – 24



Activity and Interaction Construction of infrastructure require habitat clearing			
Dimension	Rating	Motivation	Significance
		can recover in 1-5 years.	
Extent	Limited (2)	If contractors adhere to mitigation such as to limit the footprint of disturbance to only essential areas.	
Intensity x of type impact	Moderate negative (-3)	- Dependent on sensitivity of the specific site.	
Probability	Unlikely (3)	It is unlikely that compaction will have an effect after rehabilitation	
Nature	Negative		



6.3 132 kV Distribution Line Alternatives

6.3.1 Project activity: Construction of Surface Infrastructure

The construction of various surface infrastructure components will mean the removal, partial or complete of vegetation/habitat types present.

Table 6-7: Interactions and Impacts of 132 kV Infrastructure Considered

Interaction	Impact
Site clearing and infrastructure construction.	Direct loss of habitat types and biodiversity.
	Loss of Avifaunal species of special concern (protected species), due to collision or electrocution.

6.3.1.1 Impact Description

Eskom are considering four (4) 132 kV Distribution powerlines. These will comprise the following routings:

- Iphiva – Pongola (1) 132 kV powerline to tie in with the existing powerline, double circuit with Iphiva / Hluhluwe;
- Iphiva – Pongola (2) 132 kV powerline;
- Iphiva / Makhathini 132 kV powerline double circuit with Iphiva / Mbazwane; and
- 132 kV powerline loop-in to Candover Switching Station from the existing Impala / Normandie Line.

Of the 132 kV distribution lines considered in this assessment, only the Iphiva-Makhathini / Iphiva-Mbazwane distribution line has a routing alternative.

6.3.1.2 Management Objectives

Management objectives will be to prevent the loss of important/protected avifaunal species specifically those with Red Data Status, National and Provincial. To achieve this objective, the mitigation measures proposed in this report must be implemented.

Distribution line towers and lines pose a risk of collision, and suitable measures must be applied to avoid this make, electrocution of birds while attempting to land on the tower structures is also a great risk.

The destruction of the habitat/vegetative cover must be limited, this can be achieved by restricting the removal and disturbance of vegetation to those areas absolutely essential for



the infrastructure placements. Impact assessment ratings below are based on actual field data from field work conducted for this project.

6.3.1.3 Management Actions and Targets

Known Protected and Red Data status bird nesting, foraging and dispersion areas must be avoided. This was achieved by incorporating provincial government knowledge into this report.

Applying the mitigation hierarchy is essential to aligning the project to best practice. Therefore the avoidance of any red data species and their nesting and foraging areas is essential.

As for habitat present in the substation area, the destruction of vegetation should be limited to the areas essential for the development if construction is finalised the environmental officer must ensure the construction areas are rehabilitated. Areas of erosion must be marked and attended to before the following wet season starts.

Rehabilitation of disturbed areas should take place within a week of construction, all bare patches of soil should be vegetated, preferably with pioneer species which will colonise open and disturbed areas relatively quickly, and prevent erosion and alien vegetation establishing.

6.3.1.4 Impact Ratings

Table 6-8: Potential Impacts of Construction of the 132kV Distribution Lines Infrastructure

Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Direct loss of avifauna habitat and biodiversity			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	The risk to avifauna will be permanent.	Moderate (negative) – 105
Extent	Limited (3)	Risks are only associated with the pylon infrastructure and the transmission lines.	
Intensity x type of impact	Serious (5)	The footprint of distribution lines covers dispersion areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur.	



Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Nature	Negative		
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post- mitigation			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 44
Extent	Limited (3)	Mitigation measures could limit bird and powerline interaction.	
Intensity x type of impact	Moderate (-3)	Dependent on sensitivity of the specific site.	



Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Probability	Probable (4)	This impact could occur	
Nature	Negative		

Activity and Interaction: Construction of infrastructure require vegetation clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Loss of species of special concern (protected species)			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	The risk to avifauna will be permanent.	Moderate (negative) – 105
Extent	Limited (3)	Risks are only associated with the pylon infrastructure and the transmission lines.	
Intensity x type of impact	Serious (5)	The footprint of distribution lines covers dispersion areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur.	
Nature	Permanent (7)	The risk to avifauna will be permanent.	
<i>Mitigation/ Management actions</i>			
<ul style="list-style-type: none"> A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. 			



Activity and Interaction: Construction of infrastructure require vegetation clearing			
Dimension	Rating	Motivation	Significance
		<ul style="list-style-type: none"> ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 	
Post management			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 44
Extent	Limited (3)	Mitigation measures could limit bird and powerline interaction.	
Intensity x type of impact	Moderate (-3)	Dependent on sensitivity of the specific site.	
Probability	Probable (4)	This impact could occur.	
Nature	Negative		



6.4 Iphiva-Duma 400 kV (Ref. No. 14/12/16/3/3/2/1038)

6.4.1 Project Activity: Construction of Surface Infrastructure

The construction of various surface infrastructure components will mean the removal, partial or complete of vegetation/habitat types present.

Table 6-9: Interactions and Impacts of 400 kV Infrastructure Considered

Interaction	Impact
Site clearing and infrastructure construction.	Direct loss of habitat types and biodiversity.
	Loss of Avifaunal species of special concern (protected species), due to collision or electrocution.

6.4.1.1 *Impact Description*

The Iphiva – Duma 400 kV powerline will extend over a 130 km (final length is 107 km) routing in the southern portion of the overall study area. Three technically feasible alternative routing options were considered in this assessment, namely the eastern, west 1 and west 2 corridors. After consultation with stakeholders a deviation concerning the Western corridors was included as a mitigation measure (Figure 6-1). This process is discussed in detail below. The overhead powerline will be supported by towers positioned within a 55 m servitude⁵. Possible tower types⁶ that may be considered for this Project include:

- Cross rope; and
- Self-supporting.
- Guyed vee

The construction of surface infrastructure which will include access roads and the actual tower footprints will affect the current habitat and vegetation types present. This includes habitat and dispersion areas associated with Vultures.

With the clearing of vegetation, open areas will occur, here indigenous vegetation and habitat will be replaced by fast growing alien and weed vegetation, degrading the habitat

⁵ The servitude will allow for clearance of 27.5 m on either side of the centre line of the powerline. Where constructed in parallel, a minimum distance of 55 m between the centre points is required. The minimum vertical clearance distance between the ground and powerline conductor is 8.1 m.

⁶ Eskom will determine the tower type after establishing the final routing alignment and associated profiling with the necessary environmental authorisations. Please refer to the Scoping Report and EIA for detailed descriptions of the various tower types.



present that could be critical to vultures, specifically tree nesting vultures. This impact can be greatly reduced with the correct implementation of alien vegetation management plan, and the adherence to mitigation measures.

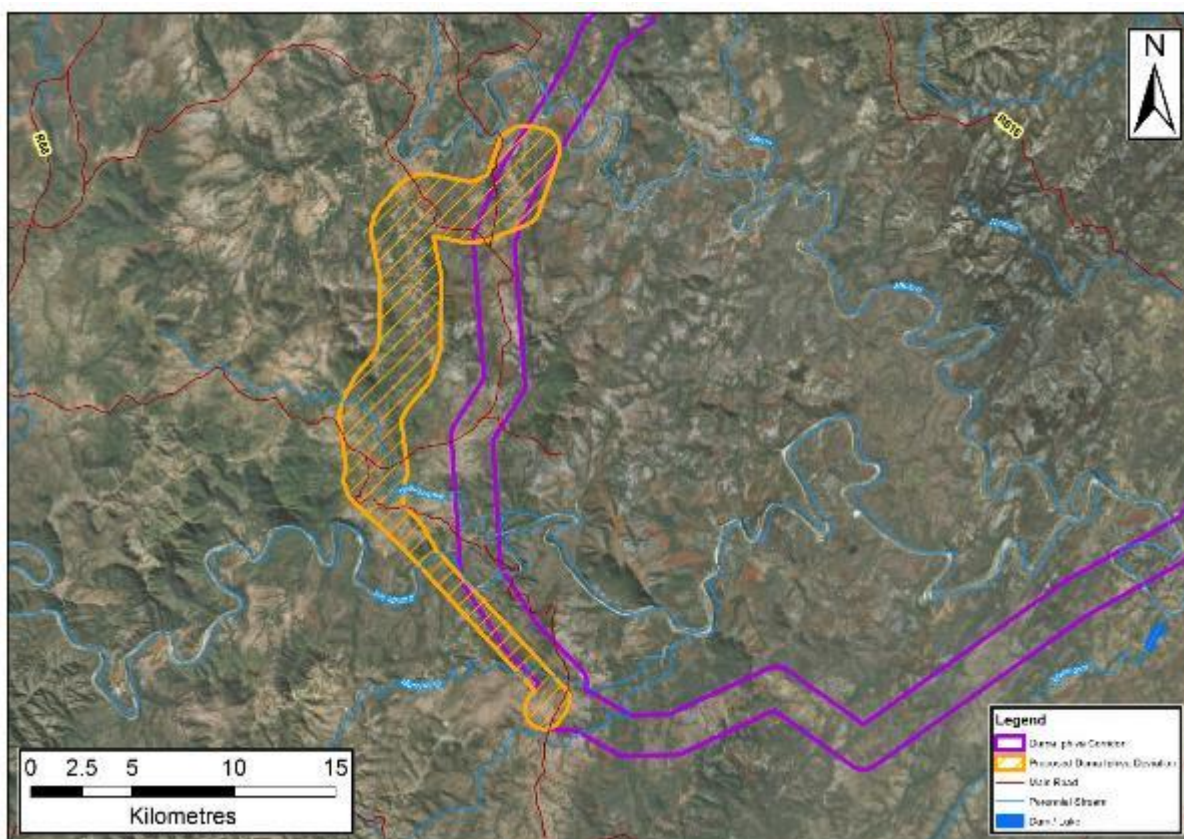


Figure 6-1: Proposed Iphiva-Duma West Deviation

Powerlines result in both physical (i.e. alienation of conservation land, bird strikes, etc.) and visual impacts. In addition, different avifaunal species are affected differently by power lines, with some species being more prone to electrocution or collisions than others. For example, in the case of some raptors, their “high electrocution rate is a result of the incompatibility of raptors and certain reticulation and distribution power lines structures” (Barnes, 2000)^[1], while in other bird species collisions with conductors or earth wires can prove to be fatal. Age is also contributing factor, as fledglings and adults in some species are also affected differently by power lines; fledglings may be more prone to collisions due to inexperience, while adults collide with power lines as a result of bad weather, for example misty conditions leading to poor visibility.

With regards to this particular project, additional powerlines increase the area of impact at this location and the frequency of impacts, as the proposed location falls within the vulture movement corridor. This will result in (1) severe impacts the threatened vulture species (and

^[1] Barnes, K.N. (ed.) 2000. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg



other avifaunal species) and thereby negatively impact upon the provinces conservation goals and targets, and (2) eliminate opportunities for securing critically important habitats for the purpose of biodiversity conservation. (Ms. Denisree Thambu personal. communication 2018/03/09).

All three routing options were unsuitable as far as criteria 3 (Threatened Ecosystems) were concerned, with I-D West Deviation affecting slightly less of the Imfolozi Savanna Sourveld threatened ecosystem.

6.4.1.2 Management Objectives

Management objectives will be to prevent the loss of important/protected Avifaunal, species specifically those with Red Data Status, National and Provincial. To achieve this objective, the mitigation measures proposed in this report must be implemented.

Transmission line towers and lines pose a risk of collision, and suitable measures must be applied to avoid this make, electrocution of birds while attempting to land on the tower structures is also a great risk. Mitigation measures supplied here are specifically designed to minimise this risk. Of specific risk here are the tree nesting vulture that have been identified and is being tracked by Ezemvelo KZN Wildlife. Nesting locations are not know, only the dispersion of the Vultures.

The destruction of the habitat/vegetative cover must be limited, this can be achieved by restricting the removal and disturbance of vegetation to those areas absolutely essential for the infrastructure placements.

6.4.1.3 Management Actions and Targets

Known Protected and Red Data status bird nesting, foraging and dispersion areas must be avoided. This can be achieved by incorporating provincial government knowledge into this report.

Applying the mitigation hierarchy is essential to aligning the project to best practice. Therefore the avoidance of any red data species and their nesting and foraging areas is essential, this is discussed in more detail below.

As for habitat present in the powerlines project area, the destruction of vegetation should be limited to the areas essential for the development if construction is finalised the environmental officer must ensure the construction areas are rehabilitated. Areas of erosion must be marked and attended to before the following wet season starts.

Hluhluwe–iMfolozi National Park is the key breeding area for both African White-back and Lappet-faced Vultures in the KZN province include other breeding areas south of Hluhluwe–iMfolozi on Thula-Thula. It is essential for conservation targets for these protected and endangered species that impacts associated with this project be considered in line with the mitigation hierarchy.



A Black Rhino expansion area is planned to be implemented east of the Duma substations, in a southerly direction. The Iphiva-Duma East transmission line corridor will affect this expansion area.

Any negative impacts on Protected Areas and important biodiversity would negatively affect any opportunity for the province to contribute and/or meet its biodiversity targets, which contributes towards national targets and South Africa's international obligation to the International Union for Conservation of Nature's (IUCN) to conserve representative samples of biodiversity. In an attempt to mitigate the impact on these Vulture species, an additional line route has been proposed as a mitigation measure, this is called the Iphiva-Duma West alignment.

It is envisaged that the additional routing option will attempt to create distance between the dispersion zone hotspots (breeding time dispersion) of these Vultures and the powerline infrastructure. In addition, the specific line location could be within existing corridors where roads and other linear infrastructure are already present in this new option. This action is specifically aimed at avoiding collisions and electrocutions. This mitigation measure is in addition to the standard mitigation measures discussed in this impact assessment.

6.4.1.4 Impact Ratings

Table 6-10: Potential Impacts of Construction of the Iphiva-Duma 400kV Line Infrastructure

Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Direct loss of avifauna habitat and biodiversity			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	The risk to avifauna will be permanent.	Moderate (negative) – 105
Extent	Limited (3)	Risks are only associated with the pylon infrastructure and the transmission lines.	
Intensity x type of impact	Serious (5)	The footprint of powerlines cover dispersion and nesting areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur. It is not known exactly where the SSC are	



Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
		nesting thought.	
Nature	Negative		
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post- mitigation			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 44
Extent	Limited (3)	Historical evidence has been shown that mitigation measures could limit bird and powerline interaction.	
Intensity x	Moderate (-3)	Dependent on sensitivity of the	



Activity and Interaction Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
type of impact		specific site. Habitat that SSC are dependent on can be avoided.	
Probability	Probable (4)	This impact could occur	
Nature	Negative		

Activity and Interaction: Construction of infrastructure require vegetation clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Loss of species of special concern (protected species)			
Prior to mitigation/ management			
Duration	Permanent (7)	The risk to avifauna will be permanent, but can be mitigated.	Major (negative) – 112
Extent	Limited (4)	Risks are only associated with the pylon infrastructure and the transmission lines, across the entire 130 km route.	
Intensity x type of impact	Serious (5)	The footprint of distribution lines covers dispersion and nesting areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur due to collisions and electrocutions.	
Nature	Negative		
Mitigation/ Management actions			
<ul style="list-style-type: none"> A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close 			



Activity and Interaction: Construction of infrastructure require vegetation clearing

Dimension	Rating	Motivation	Significance
<p>proximity to the towers.</p> <ul style="list-style-type: none"> ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post management			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 60
Extent	Limited (4)	Historical evidence has been shown that mitigation measures could limit bird and powerline interaction.	
Intensity x type of impact	Moderate (-3)	Dependent on sensitivity of the specific site w.r.t. nesting and feeding. Nesting and areas of high occurrence can be avoided after walkdown.	
Probability	Likely (5)	This impact is likely to occur.	
Nature	Negative		



6.5 Normandie-Iphiva 400 kV (Ref. No. 14/12/16/3/3/2/1036)

6.5.1 Project activity: Construction of Surface Infrastructure

The construction of various surface infrastructure components will mean the removal, partial or complete of vegetation/habitat types present.

Table 6-11: Interactions and Impacts of the Normandie-Iphiva 400Kv Infrastructure Considered

Interaction	Impact
Site clearing and infrastructure construction.	Direct loss of habitat types and biodiversity.
	Loss of avifaunal species of special concern (protected species), due to collision or electrocution.

6.5.1.1 Impact Description

The Normandie – Iphiva 400 kV powerline will extend over an approximate 150 km routing in the northern portion of the overall study area. Eskom considered the results of the scoping assessment, discarding routing options with significant sensitivities. The remaining N-I 2 and N-I 3 alternative routing options were considered in this assessment.

With the clearing of vegetation, open areas will occur, here indigenous vegetation will be replaced by fast growing alien and weed vegetation. This impact can be greatly reduced with the correct implementation of alien vegetation management plan.

6.5.1.2 Management Objectives

Management objectives will be to prevent the loss of important/protected Avifaunal, species specifically those with Red Data Status, National and Provincial. To achieve this objective, the mitigation measures proposed in this report must be implemented.

Transmission line towers and lines pose a risk of collision, and suitable measures must be applied to avoid this make, electrocution of birds while attempting to land on the tower structures is also a great risk.

The destruction of the habitat must be limited; this can be achieved by restricting the removal and disturbance of vegetation to those areas absolutely essential for the infrastructure placements.



6.5.1.3 Management Actions and Targets

Known Protected and Red Data status bird nesting, foraging and dispersion areas must be avoided. This can be achieved by incorporating provincial government knowledge into this report.

Applying the mitigation hierarchy is essential to aligning the project to best practice. Therefore the avoidance of any red data species and their nesting and foraging areas is essential.

As for habitat present in the project area, the destruction of vegetation should be limited to the areas essential for the development if construction is finalised the environmental officer must ensure the construction areas are rehabilitated. Areas of erosion must be marked and attended to before the following wet season starts.

Rehabilitation of disturbed areas should take place within a week of construction, all bare patches of soil should be vegetated, preferably with pioneer species which will colonise open and disturbed areas relatively quickly, and prevent erosion and alien vegetation establishing.

6.5.1.4 Impact Ratings

Table 6-12: Potential Impacts of Construction of the Normandie-Iphiva 400kV Line Infrastructure

Activity and Interaction: Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Impact Description: Direct loss of avifauna habitat and biodiversity			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	The risk to avifauna will be permanent.	Moderate (negative) – 105
Extent	Limited (3)	Risks are only associated with the pylon infrastructure and the transmission lines.	
Intensity x type of impact	Serious (5)	The footprint of powerlines cover dispersion and nesting areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur.	
Nature	Negative		



Activity and Interaction: Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr. ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post- mitigation			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 44
Extent	Limited (3)	Mitigation measures could limit bird and powerline interaction.	
Intensity x type of impact	Moderate (-3)	Dependent on sensitivity of the specific site.	
Probability	Probable (4)	This impact could occur	



Activity and Interaction: Construction of infrastructure require site clearing			
Dimension	Rating	Motivation	Significance
Nature	Negative		

Activity and Interaction: Construction of infrastructure require vegetation clearing)			
Dimension	Rating	Motivation	Significance
Impact Description: Loss of species of special concern (protected species)			
<i>Prior to mitigation/ management</i>			
Duration	Permanent (7)	The risk to avifauna will be permanent.	Moderate (negative) – 105
Extent	Limited (3)	Risks are only associated with the pylon infrastructure and the transmission lines.	
Intensity x type of impact	Serious (5)	The footprint of distribution lines covers dispersion and nesting areas of multiple bird SSC.	
Probability	Definite (7)	It is likely bird fatalities will occur.	
Nature	Permanent (7)	The risk to avifauna will be permanent.	
Mitigation/ Management actions			
<ul style="list-style-type: none"> ▪ A suitable qualified avifauna specialist must undertake a walk through of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers. ▪ The avifauna specialist should identify the stretches of the powerlines that require 			



Activity and Interaction: Construction of infrastructure require vegetation clearing)			
Dimension	Rating	Motivation	Significance
<p>bird diverters. These must be added to the profiles in the EMPr.</p> <ul style="list-style-type: none"> ▪ Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands; ▪ Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action; ▪ Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted. ▪ Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and ▪ Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants). 			
Post management			
Duration	Permanent (5)	Infrastructure will be present for the life of the project.	Minor (negative) – 60
Extent	Limited (3)	Mitigation measures could limit bird and powerline interaction.	
Intensity x type of impact	Moderate (-3)	Dependent on sensitivity of the specific site.	
Probability	Likely (5)	This impact is likely to occur	
Nature	Negative		



7 Consideration of Alternatives

The consideration of alternatives for the project infrastructure, from an avifaunal perspective, centred on the ecological sensitivity present in each alternative, this approach is discussed below.

In terms of ecological sensitivity, the following features were assessed to determine how sensitive the habitats identified within the alternatives are:

- Presence or absence of Red Data or protected bird species (Vulture Restaurants);
- Presence or absence of exceptional Avifaunal species diversity;
- Extent of intact habitat in good ecological condition in the absence of disturbance; and
- Presence or absence of important ecosystems such as Protected Areas, areas demarcated for future protected area status (NPAES) and wetlands.

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as meeting biodiversity targets for the country's variety of ecosystems. These guidelines are essential to consult for development projects, and will form an important part of the sensitivity analysis. Areas earmarked for conservation in the future, or that are essential to meet biodiversity and conservation targets should not be developed, and have a high sensitivity as they are necessary for overall functioning. In addition, site specific infield assessments and the utilization of the data captured during such infield assessments must be utilized during a more comprehensive sensitivity analysis in a much finer scale to confirm the accuracy of any guideline documents that normally utilize available desktop information on a broader scale. The information gathered needs to be analyzed in order to put site specific infield condition into a more localized context.

The following assessments were utilized to inform the sensitivity of the alternatives:

7.1.1 Kwa-Zulu Natal Conservation plan; Critical Biodiversity Areas, including centers of Endemism.

The purpose of the KZN C-Plan is to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). Bioregional plans are one of a range of tools provided for in the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) that can be used to facilitate biodiversity conservation in priority areas outside the protected area network. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorizations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity (Figure 7-1).

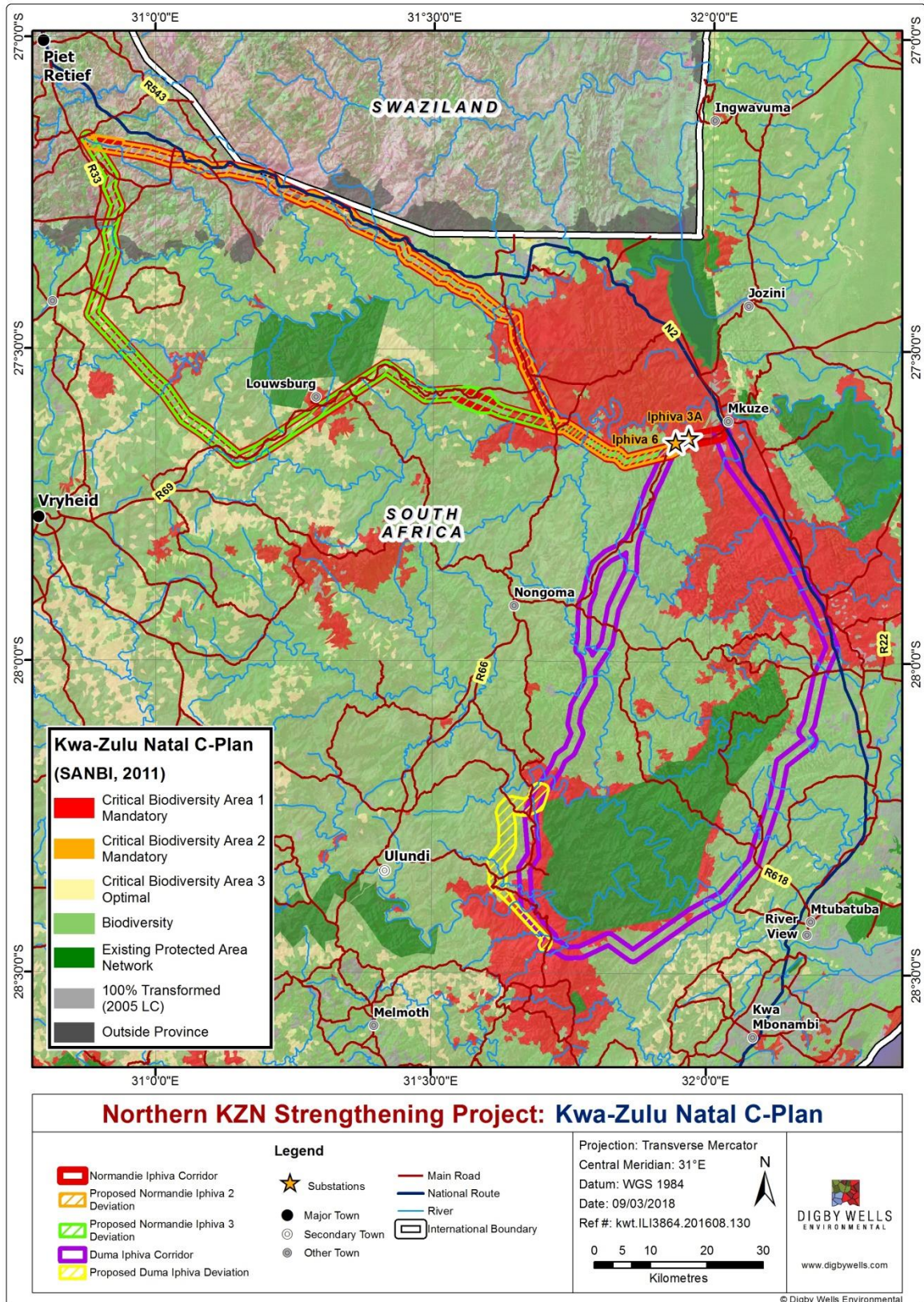


Figure 7-1: Kwa-Zulu Natal C-Plan



7.1.2 Protected areas

Officially protected areas, either Provincially or Nationally that occur close to any proposed project development site could have severe consequences from an environmental authorization point of view and/or from the associated impacts from such development on the surrounding environment (Figure 7-2).

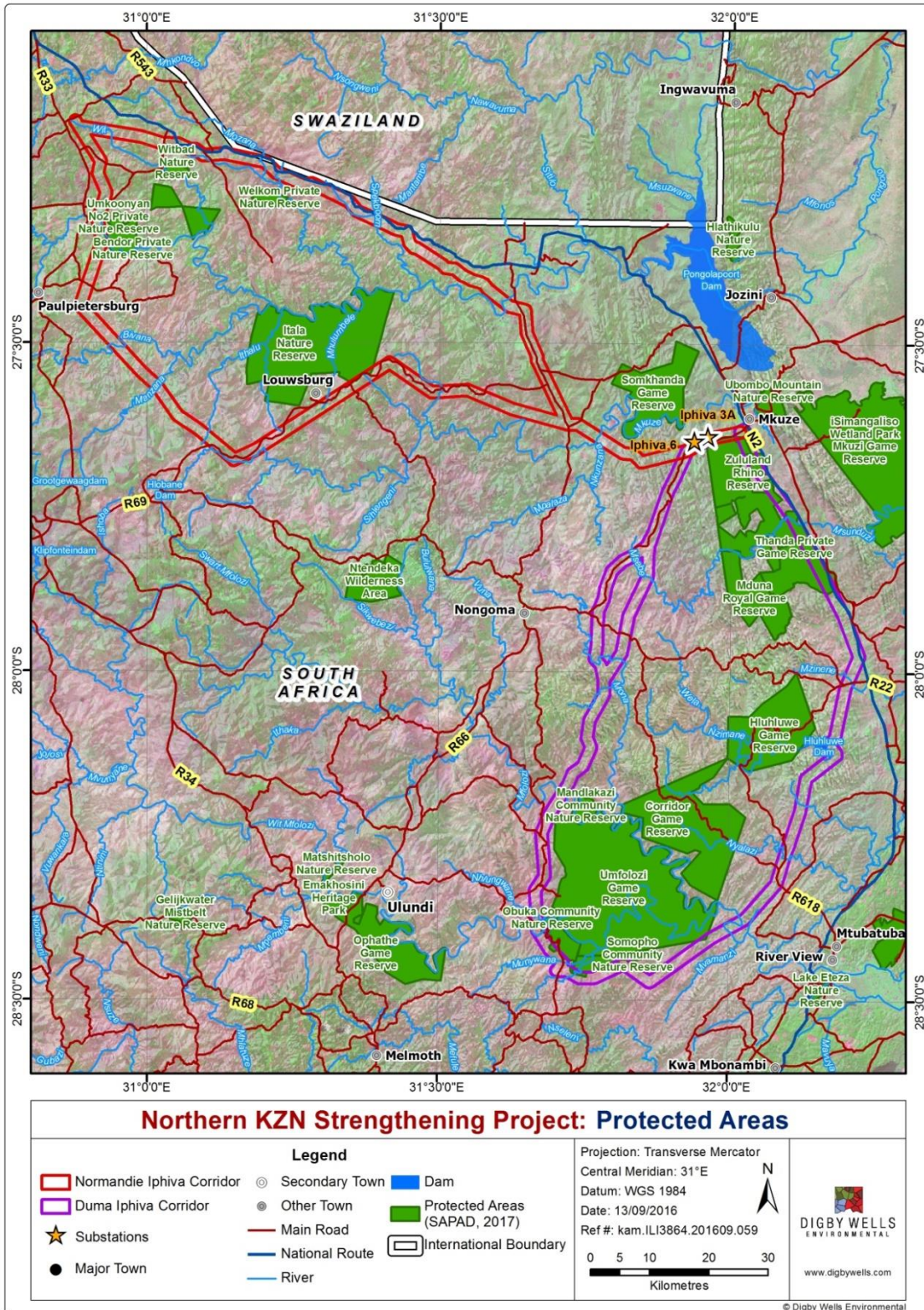


Figure 7-2: Protected Areas



7.1.3 Nationally Threatened Ecosystems

The Biodiversity Act (Act 10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value (Figure 7-3).

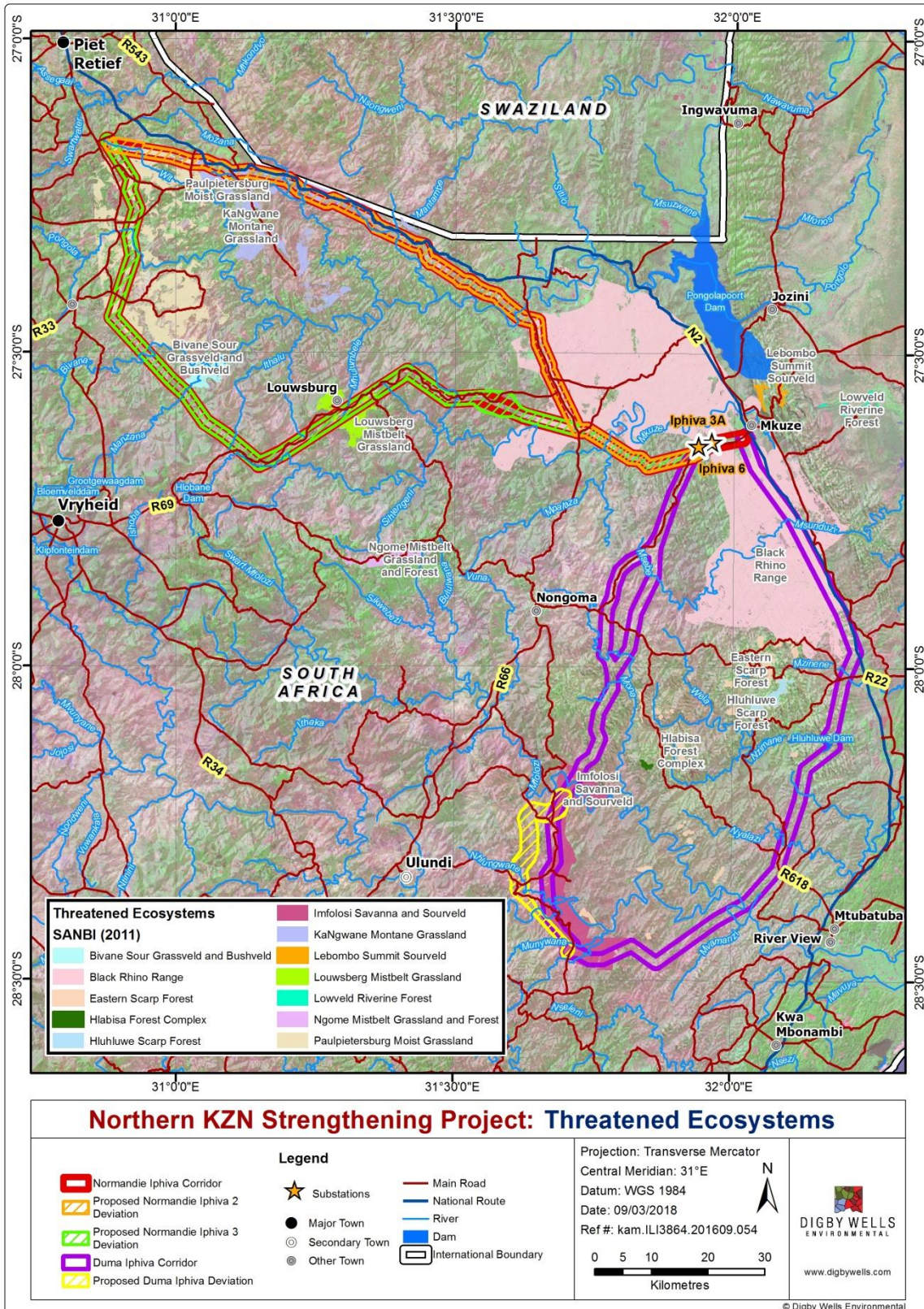


Figure 7-3: Nationally Threatened Ecosystems



7.1.4 Nationally Protected Areas Expansion strategy/Current Land Use.

Protected areas are areas of land or sea that are protected by law and managed mainly for biodiversity conservation.

South Africa's protected area network currently falls far short of sustaining biodiversity and ecological processes. In this context, the goal of the National Protected Area Expansion Strategy is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change (Figure 7-4).

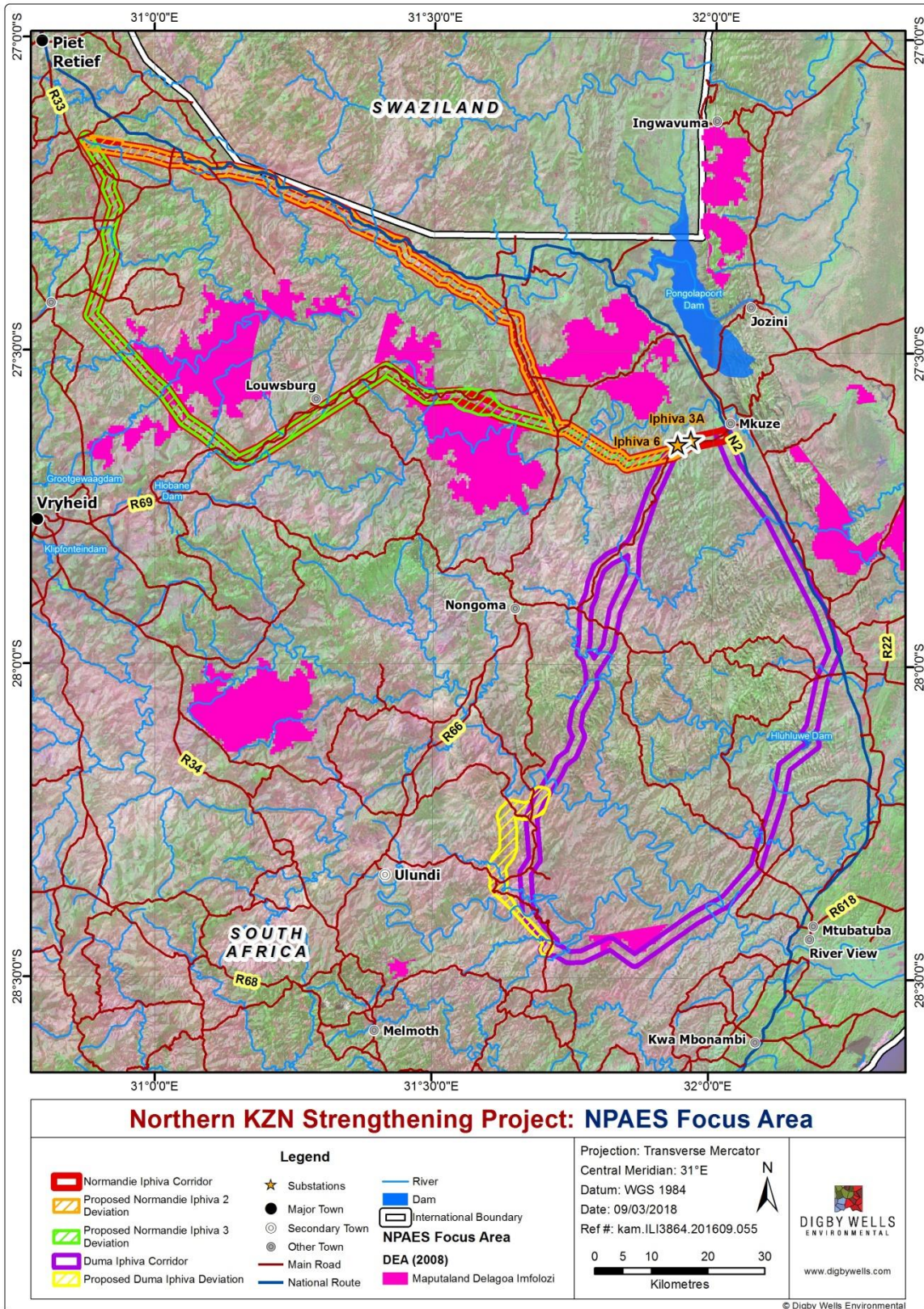


Figure 7-4: NPAES



7.1.5 Important Bird Areas

An Important Bird Area (IBA) is an area recognised as being globally important habitat for the conservation of bird populations. Currently there are about 10,000 IBAs worldwide. At present, South Africa has 124 IBA's, covering over 14 million hectares of habitat for our threatened, endemic and congregatory birds. Yet only a million hectares of the total land surface covered by our IBA's is legally protected. The BirdLife SA IBA programme continues a programme of stewardship which will ultimately achieve formal protection (Birdlife, 2013) (Figure 7-5).

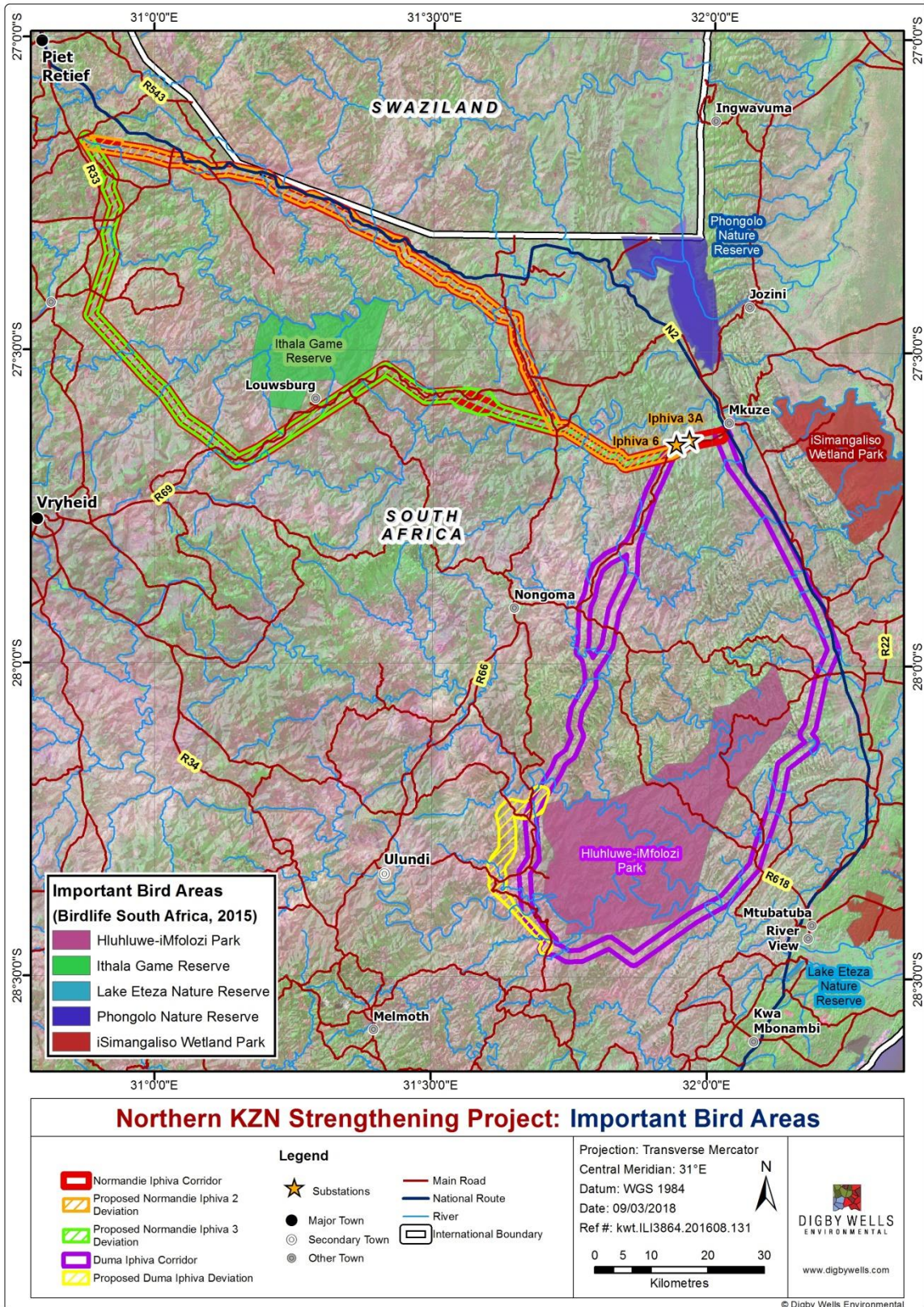


Figure 7-5: Important Bird Areas



A vulture restaurant is a place where fresh and poison-free meat and/or carcasses of domestic livestock or wild mammals are put out for vultures and other scavengers. Feeding vultures at vulture restaurants can contribute to the survival of these birds, especially during periods of food scarcity and when young birds fledge. Vultures, like many other large birds, are under pressure from many different causes in the modern world as the human population increases. (EWT Birds Of Prey Programme).

The Vulture Restaurants that are present in the region of the project infrastructure is depicted in Figure 7-6. The N-I 2 route is favoured in all the other criteria, in this case the Mhlatini Game Ranch is in close proximity to the 2 km corridor, but not within it, furthermore, the alignment within the corridor could be kept as far east as possible to create space between the restaurant and the actual powerline. The Iphiva Duma East option is extremely sensitive to this criterion, while the I-D West option is not affected at all (Figure 7-6).

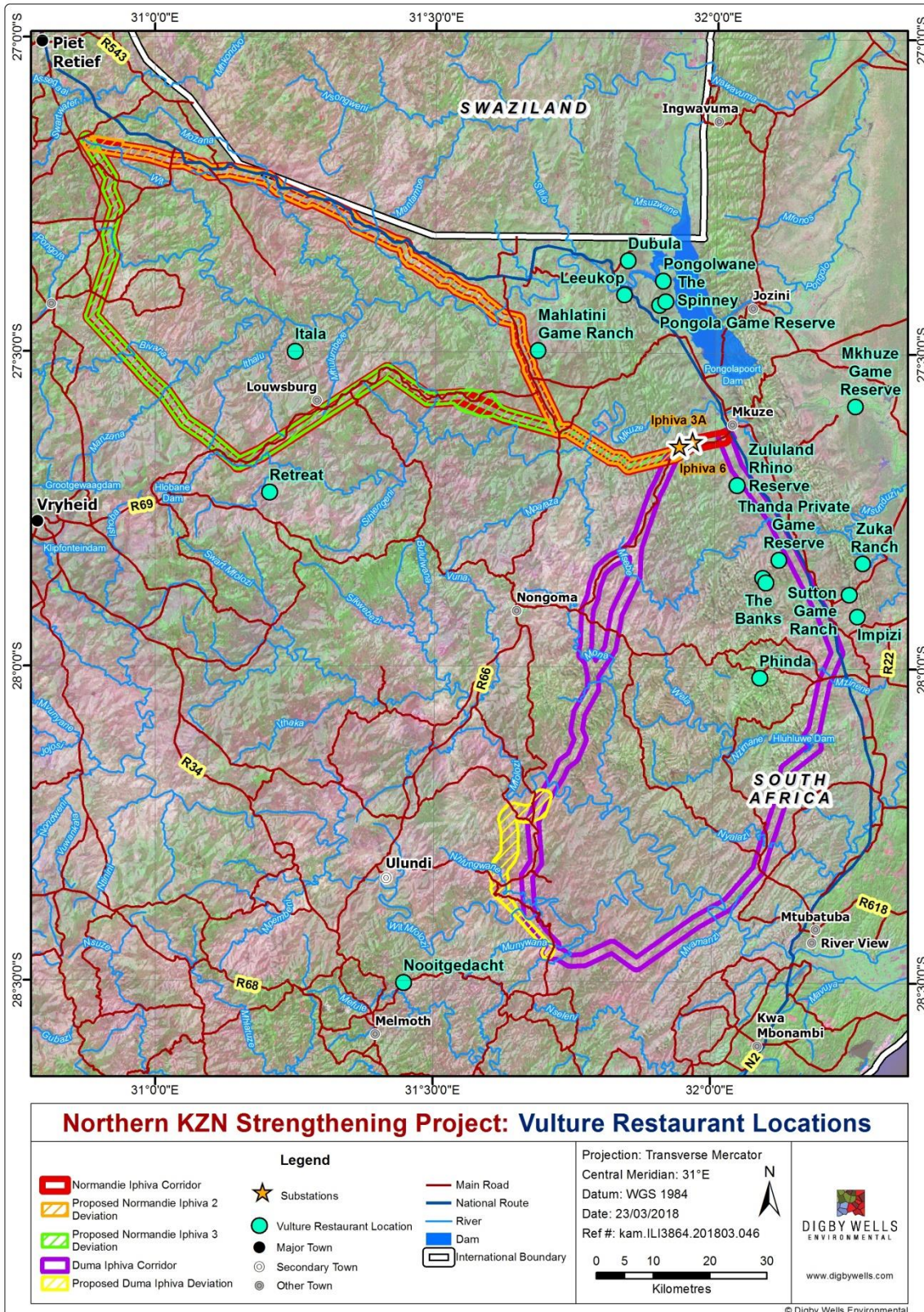


Figure 7-6: Vulture Restaurants relative to Infrastructure



Terrestrial conservation priorities highlighted in the Terrestrial Systematic Conservation Plan (CPLAN) for the Province (EKZNW, 2010) are shown in Figure 7-1. According to this plan, the majority of the project site and proposed corridors fall within areas known as Biodiversity areas, all the alternatives cross Critical Biodiversity areas 1 Mandatory, or Critical Biodiversity areas Optimal. The existing protected area network is not affected by the corridors or substations.

Biodiversity Priority Areas (BPAs) refer to natural areas that are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. The importance of the biodiversity features in Biodiversity Priority Areas and the associated ecosystem services is sufficiently high that, if their existence and condition are confirmed, the likelihood of a fatal flaw for new development projects is high (i.e. development projects are likely to be significantly constrained or may not receive necessary environmental authorizations).

Table 7-1: Multi-Criteria Decision Making Analysis

Route option	C-Plan	Protected Areas	Threatened Ecosystems	IBA/Nests/Vulture Restaurants	Current Land Use
Iphiva 2	High	Low	High	Low	Low
Iphiva 3	High	Moderate	High	High	Moderate
West 1	High	Moderate	High	High	High
West 2	High	Moderate	High	High	High
East	High	High	High	High	High

7.2 Iphiva Substation 6 (Ref. No. 14/12/16/3/3/2/1037)

The consideration of alternatives assessed the two Iphiva Substation site-specific study areas against the aforementioned criteria. The following table presents the designated ratings and consequent results:

Table 7-2: Consideration of Alternatives for the Iphiva Substations

Alternatives	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Total %	Rating	
Substation 3	1	2	2	5	1	40%	3.00	Negligible / insignificant
Substation 6	1	4	4	5	5	80%	4.00	Suitable

During the detailed field visit that was completed, both the substation locations were visited and assessed from an Avifaunal point of view. The presence of bird species in general and the presence of SSC were assessed. The habitat present was evaluated in terms of the suitability of the vegetation to harbour SSC, or to be part of their dispersion area. It was



found that the habitat present at location 6 was impacted by the presence of the local community, with location 3 being undisturbed and more natural. No SSC were encountered on either of the substation sites, a Brown Snake Eagle was recorded close to option 3.

7.3 132 kV Distribution Line Alternatives

Eskom are considering four (4) 132 kV Distribution powerlines. These will comprise the following routings:

- Iphiva – Pongola (1) 132 kV powerline to tie in with the existing powerline, double circuit with Iphiva / Hluhluwe;
- Iphiva – Pongola (2) 132 kV powerline;
- Iphiva / Makhathini 132 kV powerline double circuit with Iphiva / Mbazwane;
- 132 kV powerline loop-in to Candover Switching Station from the existing Impala / Normandie Line.

Of the 132 kV distribution lines considered in this assessment, only the Iphiva-Makhathini / Iphiva-Mbazwane distribution line has a routing alternative as per Figure 7-7.

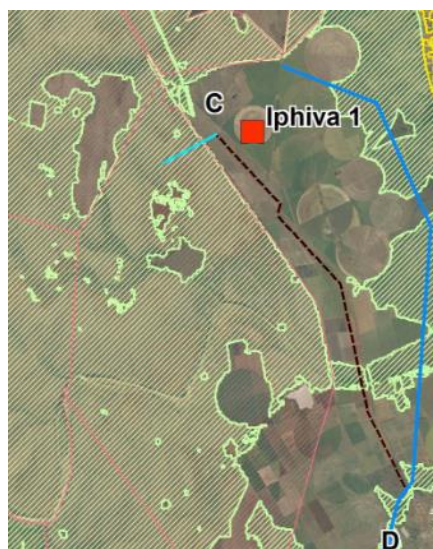


Figure 7-7: Iphiva-Makhathini / Iphiva-Mbazwane Routing Alternatives.

The following table presents the designated ratings and consequent results:



Table 7-3: Consideration of Iphiva-Makhathini / Iphiva-Mbazwane routing alternatives

Alternatives	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Total %	Rating	
East	1	3	3	3	1	40%	3.00	Negligible / insignificant
West	5	3	3	3	5	80%	4.00	Suitable

The east routing was found to be on the footslopes of the Ubombo Mountain range where the topography has made the majority of this alternative unsuitable to agriculture. This means that the natural vegetation type present is still intact. Certain bird species of conservation concern was encountered here, including the Green Sandpiper (Rare) and Saddle Billed Stork (VU).

The Western routing option was found to be following the road that is present here, however the sightings of the bird species of conservation concern was in close proximity to this line. It must be mentioned that White Backed Vulture (*Gyps africanus*) (CR), Lappet Faced Vulture (*Torgos tracheliotos*) (EN) and Bateluer (*Terathopius ecaudatus*) (NT) nests are present in close proximity to these alternatives. With this in mind, the consideration of alternatives and mitigation measures is imperative, and mitigation measures on the final decision will have to stringently applied.

Further to the recognised routing alternative of the Iphiva-Makhathini / Iphiva-Mbazwane distribution line, Eskom are proposing alternatives in respect of design for a portion of the proposed routing along the P234 road. These will comprise varying combinations of above and below ground options as presented in Table 7-4.

Table 7-4: Design alternative for the 132 kV distribution lines and 400 kV powerline along the P234 road

Design Alternatives	Options	
	Iphiva-Duma West	Iphiva-Duma East
All above ground	1	2
4 x 132 kV powerline below ground 1 x 400 kV powerline above ground	3	4
All below ground	No 400 kV line occurs within P234 corridor in this configuration. Therefore, all 132 kV distribution lines will be	



	below ground	
4 x 132 kV powerline above ground on double circuit 1 x 400 kV powerline below ground	No 400 kV line occurs within P234 corridor in this configuration. Therefore, all 132 kV distribution lines will be above ground	6
1 x 400 kV and 2 x 132kV powerlines above ground on multi-circuit 1 x 132kV powerline below	N/A	7

Impacts that are considered concerning, with regards to these options centred on habitat destruction of bird species of special concern, collisions of birds with powerlines or pylons and electrocutions, as bird SSC are present in the area, including nesting sites for White Backed Vulture (*Gyps africanus*) (CR), Lappet Faced Vulture (*Torgos tracheliotos*) (EN) and Bateluer (*Terathopius ecaudatus*) (NT). The burying of powerlines will negate the negative impacts concerned with collisions and electrocutions, but will affect the natural habitat of ground dwelling bird species that may be present. As the burying of transmission lines will necessitate a larger footprint of vegetation or habitat to be disturbed, this option does have negative impacts associated with it, especially removal of habitat that could be important for bird SSC dispersion and foraging. Furthermore it is envisioned that the maintenance of the buried lines will require disturbance to vegetation that has been restored, this will negatively affect the carrying capacity and species richness of the disturbed area.

The specific habitat type is however not isolated or rare but is common in the project area in general.

The remainder of this section therefore considers the proposed distribution line routings in respect of above and below ground options against the following criteria:

- The level of disturbance needed to bury the powerlines will require habitat removal; and
- The presence of avifaunal species of special concern.

The following table presents the designated ratings, from the consideration of criteria and consequent results:


Table 7-5: Consideration of below and above ground alternatives

Alternatives	Criteria 1	Criteria 2	Total %	Rating	
Below ground	1	5	60%	3.00	Negligible / insignificant
Above ground	3	1	40%	2.00	Less suitable

7.4 Iphiva-Duma 400 kV (Ref. No. 14/12/16/3/3/2/1038)

The consideration of alternatives assessed the three Iphiva-Duma 400 kV powerline site-specific study areas against the aforementioned criteria. Additional criteria was taken into consideration after specialist focus group meeting revealed information on tree nesting vultures present in the vicinity of this option. In Figure 7-8 below the area of occupancy and density of tree nesting vultures that are fitted with tracking devices are displayed. From this it is evident that the proposed Iphiva Duma West 1, West 2 and East all impact directly on the area of occupancy of these vultures. Furthermore, it is well known that slow moving and large bodied bird species are most at risk of collision and electrocution from powerlines and pylons.

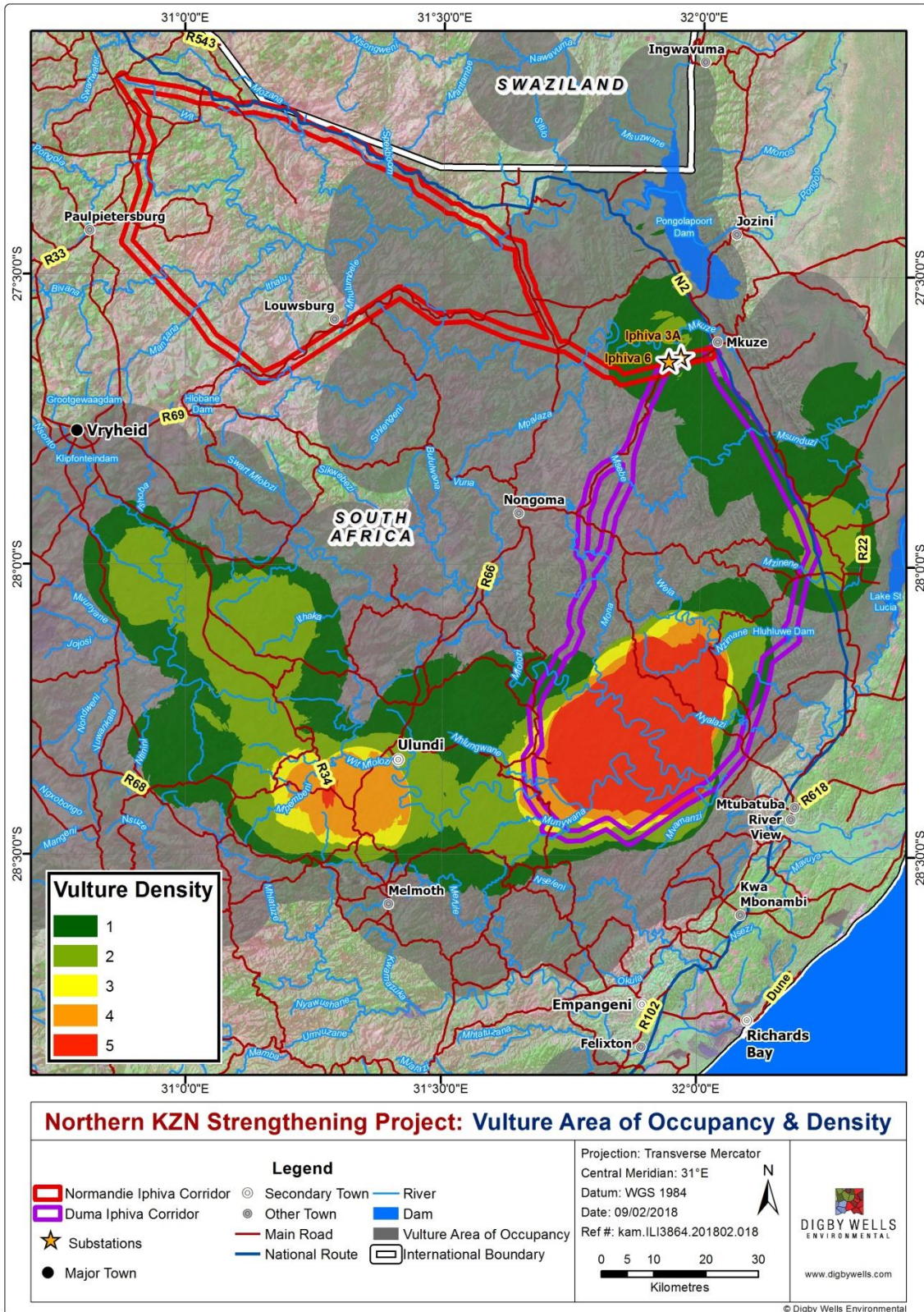


Figure 7-8: Area of Occupancy and Density for Vultures



The following table presents the designated ratings and consequent results.

Table 7-6: Consideration of Iphiva-Duma 400 kV alternatives

Alternatives	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Total %	Rating	
I-D West 1	1	3	2	2	1	40%	2.00	Less suitable
I-D West 2	1	3	2	2	1	40%	2.00	Less suitable
I-D East	1	1	1	1	1	20%	1.00	Unsuitable

The transmission lines that are planned to be constructed between Iphiva and Duma goes in a southerly direction, 3 alternatives are possible Iphiva Duma East, Iphiva Duma West 1 and Iphiva Duma West 2. Criteria 1 that was considered indicated that all three options traverse Critical Biodiversity areas 1 and Biodiversity areas, with the East option completely covered by Critical Biodiversity areas 1 and Biodiversity areas. All three routing options were unsuitable as far as criteria 3 were concerned; all three options are within the buffer zone of officially protected areas. For Criteria 4 the eastern option affects a large portion of the Black Rhino range. In order to incorporate the additional data, criteria 5 is changed in the rating table from *current land use* to *presence of SSC*.

7.5 Normandie-Iphiva 400 kV (Ref. No. 14/12/16/3/3/2/1036)

The consideration of alternatives assessed the three Normandie-Iphiva 400 kV powerline site-specific study areas against the aforementioned criteria. Based on the results of the scoping assessment, the width of the proposed Normandie-Iphiva 400 kV Powerline corridors were adjusted in two sections (Figure 7-9 and Figure 7-10). The routings however, remain unchanged, and therefore the criteria and ratings of the alternatives are not affected. The following table presents the designated ratings and consequent results:

Table 7-7: Consideration of Normandie- Iphiva 400 kV alternatives

Alternatives	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Total %	Rating	
N-I 400kv 2	1	2	4	5	3	60%	3.00	Negligible / insignificant
N-I 400kv 3	1	4	3	3	3	60%	3.00	Negligible / insignificant

From the sensitivity analysis it was found that criteria 1 (KZN C-plan) Critical Biodiversity areas are affected by both alignments. Option 2 also covers Priority areas and Critical Biodiversity areas (Optimal). For criteria 3, option 2 does not cross or come into close contact with protected areas, option 3 crosses the borders of the Itala Nature Reserve, an important bird area, and is therefore less suitable. Where criteria 4 is concerned both options cross natural habitat in the form of Moist Grassland, however option 2 also covers natural habitat in the form of Montane Grassland. Option 3 also crosses natural habitat in the form of

Grassland. Therefore the proximity of option 3 to all these protected ecosystems makes it a less desirable option. Criteria 5 were the current land use for both options, here the hectares of each option were considered. Option 2 consisted of 65% or 18 144ha of undisturbed or Natural areas, with 27% being disturbed. Option 3 consisted of 70% open or undisturbed areas or 23 246ha, with 28% or 9 235ha of disturbed land. The difference for these 2 options were rated as Negligent/insignificant, but when wetlands are taken into consideration, option 2 is more suitable due to less wetlands being present, this is seen as an important consideration as wetlands are sensitive landscapes and could harbour protected birds.

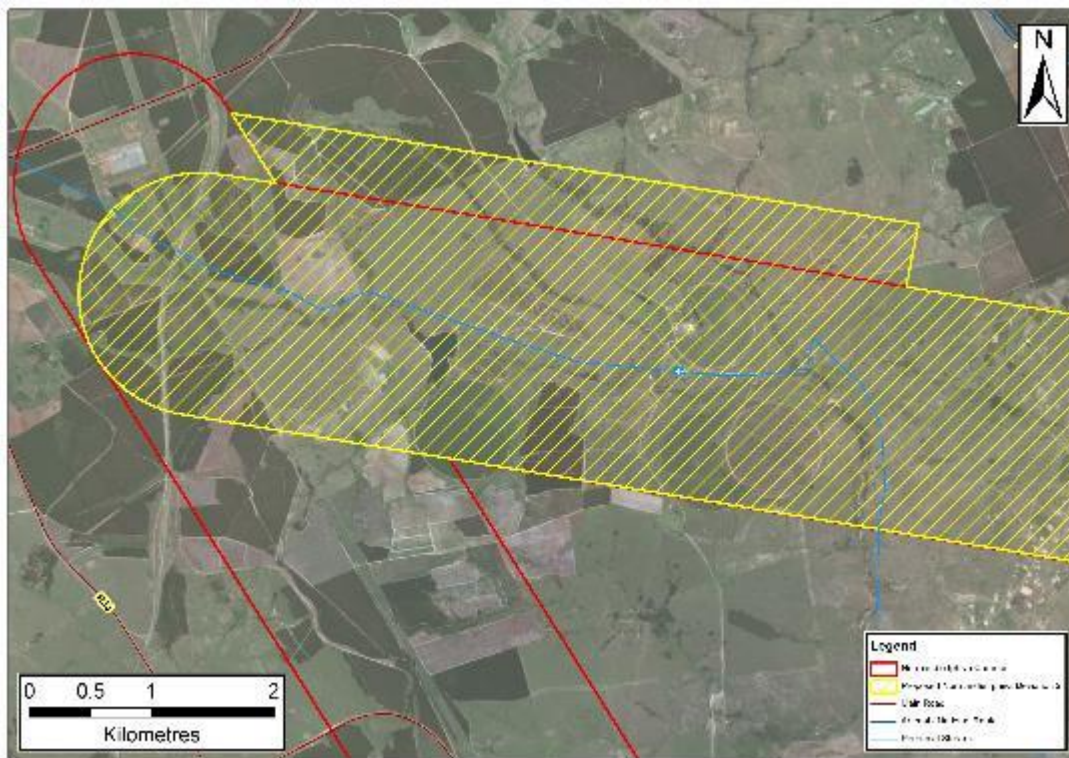


Figure 7-9: Normandi-Iphiva 2 corridor deviation

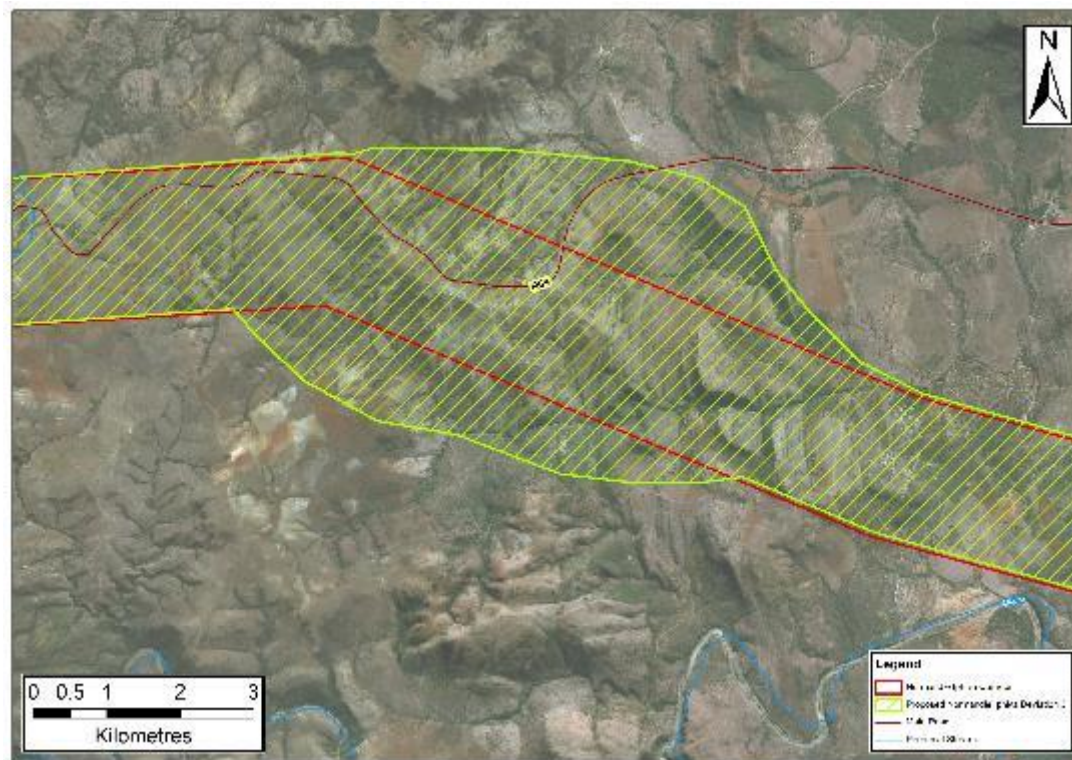


Figure 7-10: Normandi-Iphiva 3 corridor deviation

8 Consultation

This section provides as summary of the consultation process as applicable to this assessment. Consultation for the Project adhered to the regulated Stakeholder Engagement Process (SEP). Table 8-1 summarises the select activities completed as part of this process.

Table 8-1: Summary of SEP undertaken during the Scoping Phase

Activity	Details
Identification of stakeholders	A stakeholder database was developed which includes I&APs from various sectors of society, including directly affected and adjacent landowners, in and around the proposed project area.
Distribution of announcement letter and BID	A BID, announcement letter was emailed and posted to stakeholders on 16 August 2016. Furthermore, project information leaflets were distributed to all post-boxes in the site specific study area between July and August 2016.



Activity	Details
Placing of newspaper advertisement	An English and Zulu advert was placed on 11 August 2016 in: <ul style="list-style-type: none"> ▪ Excelsior News; ▪ Isolezwe; and ▪ The Mercury.
Key Stakeholder and Authority Meetings	Meetings with key stakeholders and authorities were held as follows: <ul style="list-style-type: none"> ▪ Piet Retief, 5 September 2016; ▪ Pongola, 6 September 2016; ▪ Mkhuze, 7 September 2016; and ▪ Hluhluwe, 8 September 2016.
Focus Group Meeting	Focus Group Meetings were undertaken as follows: <ul style="list-style-type: none"> ▪ Pietermaritzburg, 9 September 2016; ▪ Mkhuze, 25 October 2016; ▪ Mkhuze, 29 March 2017.
Traditional Council Meetings	Traditional Council Meetings were held from 12 September 2016 through 28 October 2016. Please refer to the Comments and Response Report for details.
Obtained comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders were captured in the Comments and Responses Report (CRR) dated 30 August 2017.

The following Avifaunal comments were recorded during the scoping phase of the Project:

Table 8-2: Avifauna specific comments and responses recorded during the Scoping Phase

Avifauna			
Comment	Date	Origin	Response
Impact on protected animals and birds' species currently within the reserve, such as wild dogs, and rhinos and vultures.	07 th September 2016	Ms Karen Holmes Public Meeting, Mkhuze	The Ecology Specialist Study will assess the potential impacts of the proposed project on protected animal and bird species.
A general ecologist specialist will be required in order to cover broad ecological issues.	9 th September 2016	Ms Dinesree Thambu FG meeting with	Guidance from the Ezemvelo KZN Wildlife (EKZNW) is appreciated and will be



Avifauna			
		EKZNW	incorporated into the Plan of Study for EIA in the Scoping Report.
There is a minimum requirements document that should be considered, and it will be made available to the project team, compliance to the requirements unless the specialist can substantiate the use of a different method.	9 th September 2016	Ms Dinesree Thambu FG meeting with EKZNW	Guidance from the EKZNW is appreciated and will be incorporated into the Plan of Study for EIA in the Scoping Report.
A portion of the study area is within the Pondoland-Albany biodiversity hotspot and has Red data and Endemic listed species.	9 th September 2016	Ms Dinesree Thambu FG meeting with EKZNW	Guidance from the EKZNW is appreciated and will be incorporated into the Plan of Study for EIA in the Scoping Report.
A concern regarding physical destruction of birds' nests.	25 th October 2016	Mr Charl Senekal Landowner Focus Group Meeting, Mkhuze	The impacts on birds will be assessed in the Avi-fauna specialist study.

Table 8-3: Comments submitted during Draft Scoping Report Review

Comments/ Questions	Date received	Origin	Responses
<p>A submission from Manyoni Private Game Reserve titled "comments and objection to the eastern Iphiva – Duma corridor & substations" included the following documents:</p> <ul style="list-style-type: none"> • Manyoni Private Game Reserve (MPGR) Opposition to Eskom's Northern KwaZulu Natal KZN Strengthening Project (16 pages). • Appendix 1: Gazette – ZRR Proclamation Notice 65 (23 April 2009) • Appendix 2: Gazette – ZRR Proclamation Notice 1522 (10 	09 October 2017	Ms Karen Odendaal Manyoni Private Game Reserve	This receipt of this submission was acknowledged, with thanks. The information will be forwarded to relevant specialists as part of detailed investigations.



Comments/ Questions	Date received	Origin	Responses
<p>October 2015)</p> <ul style="list-style-type: none"> • Appendix 3 Lepidopterists' Society of Africa Letter • Appendix 4 MPGR Vulture Incidents • Appendix 5 – ZAP Wing Opposition Eskom Lines at Manyoni • Appendix 6 – Heligistix – Opposition Eskom Lines at Manyoni • Appendix 8 Impact of Transmission Lines on the environment <p>NB: Due to the length of the submission, this has been included as a separate attachment under lengthy submissions (Annexure A1).</p>			
<p>As in IAP involved in the process since the first application we would like to point out the following issues noticed after inspecting the draft proposals.</p> <p>Without prejudice of our rights please find our comments regarding the Normandie iPhiva Draft Scoping Report:</p>	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	This receipt of this submission was acknowledged, with thanks. The information presented from a) to u) will be forwarded to relevant specialists as part of detailed investigations.
<p>a) Figure 2.1's placement of Iphiva 3 is factually incorrect. We have in the past pointed this out to Eskom and also refused EIA consultants entry to investigate this point as it was NEVER offered as a placement point for the substation. Senekal Familie Boerdery in good faith offered Eskom several viable options</p>	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The location of Iphiva 3 on Figure 2.1 is correct. We acknowledge that there was some confusion between the naming of the alternative sites in the past. This has been resolved, and the presentation in the Scoping Report is correct. The site that you refused specialists access to is now referred to Iphiva



Comments/ Questions	Date received	Origin	Responses
<p>for substation placement that are along the preferred routes. Despite all this iPhiva 3 is still contained as an option in the report yet Eskom sent their EIA practitioners to the site for inspection.</p> <p>This only serves to disgruntle IAPs as despite all of our own time we spent in meetings are for naught if Eskom decides to publish factually incorrect maps which are the heart of the application and go as far as investigating sites which were never offered. This begs the question of whether Eskom is acting in bad faith regarding the application.</p>			<p>2. Iphiva 3 is not on property owned by the Senekal family. We assume that the statements in this point refer to Iphiva 2, which is not being recommended for further assessment. Opinions of yourselves and other I&APs contributed significantly to this recommendation.</p>
<p>b) Figure 6.1 is factually incorrect. The boundaries of Zimanga are not nearly accurately portrayed, creating a false impression that the 400kva lines will be running through vacant land. We would like to place on record that the process of proclaiming Zimanga as a Protected Area will be completed soon, and that the decision to Proclaim Zimanga under the highest level of protection offered by the Protected Areas Act has already been approved by the EKZNW board.</p> <p>The management plan is currently being finalised for submission and the area will</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	<p>Figure 6.1 is only the copy of a rough map that was used during field work to start identifying issues and risks. Decisions will be based on the official datasets from DEA, SANBI and the EKZNW. Our maps are based on current data and not future plans. Please let us know as soon as your proclamation has been finalized.</p>



Comments/ Questions	Date received	Origin	Responses
<p>be proclaimed long before actual line construction commences. All land on Zimanga will therefore have to be treated as classified under the Protected Areas Act, which will be applicable before construction commences</p>			
<p>c) The corridor G-D is not indicated on any map despite it being the logical connection route. We have constantly pointed out this omission to Eskom yet they choose to ignore the fact. We have now reached application level and this has still not been corrected. This needs to be corrected as the text in Table 6.4 clearly indicates point D to be the end destination in all cases, yet all maps do not indicate the opposite?</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	<p>Corridor G-D has been indicated on the Final Scoping Report Figures. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives. The Normandie-Iphiva 400 kV powerline will start at the Normandie Substation, and end at whichever Iphiva site is authorised. As explained in the Iphiva Substation Draft Scoping Report, 13 sites were identified as potentially viable alternatives. In the Scoping Phase, these have been narrowed down to 2 sites, namely Iphiva 3 and Iphiva 6.</p>
<p>d) Despite section C-G constantly being indicated in maps and meetings, and despite Mrs Bongji Shinga's direct comment to me that "adding C-G was a mistake", the route is still contained in the maps. The C-G section is not once discussed and analysed in the Ecological Sensitivity Rating despite forming part of the application. We therefore assume that it is not</p>			<p>G-C is not part of any of the alternatives recommended for further consideration.</p>



Comments/ Questions	Date received	Origin	Responses
considered as an option as it ranks as the most ecologically damaging route to follow, containing nests of White Backed Vulture, Lappet Faced vulture, Mkuze-river riverine forest as well as a wetland of National Importance. This is not clearly indicated in this report and is still contained in maps in the final application. We deserve clarity on this line			
e) Section 6.2.11 mentions the presence of IBAs in the area. There is a new Zululand IBA that is to be proclaimed and through which the proposed routes will run.	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The latest data sets of IBAs will be obtained from EKZNW. Planned future areas to be proclaimed will also be taken into account, if provided to use, but will not have the same status as proclaimed areas.
f) In paragraph 6.2.14 we concur with the fact that you state route NI-1 will have the highest rated ecological impact.	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	Support of the recommendations is noted.
g) We note in paragraph 6.3 that the mention of burying a portion of the line is mentioned. We are in full support of this alternative especially considering the impact these massive structures will have on the ecology, security, landscape, land use and economy of the area.	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	Support of the recommendations is noted.
h) Paragraph 8.1 indicates that the addition of powerlines not going through existing Protected areas will be	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	We hope to be able to avoid any powerlines in conservation areas protected by national



Comments/ Questions	Date received	Origin	Responses
<p>possible. This needs to be changed in order to include areas in the process of proclamation. The addition of paperwork does not change the actual ecological processes on the ground, which are the reason for proclamation in the first place. By using any of the proposed routes the lines will run through protected areas/areas being proclaimed. Using route G-D only serves to limit this impact, as this is the shortest route through protected areas. As mentioned, Zimanga will be proclaimed before any construction commences with the Act regulating this type of construction on Protected areas.</p>			<p>and provincial legislation. This will have to be confirmed in the specialist studies. Future plans for protection of areas will be taken into account, but cannot have the same status as officially legally protected areas.</p>
<p>i) Mention is made that the areas will be traversed in the summer months to assess avifaunal impact, but this is not ideal as different red data species nest across different timespans of the year. To do an assessment in summer will guarantee no presence of breeding white backed vultures, bateleurs and lappet faced vultures (to name but a few), as these breed along several proposed sections of the lines, but generally towards winter/late winter.</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	
<p>j) There is an unnamed map around paragraph 8.3 that indicates site iPhiva 2 and 3</p>			<p>The title to the Figure in Section 8.3 is in the legend (top right corner) and is the</p>



Comments/ Questions	Date received	Origin	Responses
<p>and which are not the sites offered in good faith by Senekal</p> <p>Farming on their land, yet are part of the application. This is incorrect information. The simple addition of page numbers will make reference to these omissions easier.</p>			<p>Landcover data set. The substation sites indicated on this map are the ones that were considered in the Scoping Phase. Iphiva 4 is the site that the Senekal family proposed as the substation site.</p>
<p>k) Figure 9.2 does not indicate the G-D linkage which is described in the route assessments but rather focuses on G-C.</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	<p>The data on Figure 9.2 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives.</p>
<p>l) The same can be said for Figure 9.3</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	<p>The data on Figure 9.3 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives.</p>
<p>m) And figure 9.4</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	<p>The data on Figure 9.4 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives.</p>



Comments/ Questions	Date received	Origin	Responses
n) Figure 9.7 too	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The data on Figure 9.7 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives.
o) Paragraph 9.8.6 and Table 9.5 makes mention of endangered species of birds but incorrectly classifies the White Backed Vulture as Endangered whilst the IUCN ranks it as Critically Endangered meaning one step away from being extinct in the wild. One would expect Eskom to be aware of this considering past dealings regarding the initial application	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The Avi-fauna specialist will verify this information and will be updated as applicable in subsequent reports.
p) Figure 9.8 again indicates route C-G as an option despite in never being discussed with Senekal Farming, written off as a "mistake" and is never added in any ecological rating	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The data on Figure 9.8 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further consideration as part of any of the alternatives.
q) Figure 9.9, 9.10 and 9.11 same as above. Investigating every incorrect map is time consuming. Please take this as applicable to all maps and correct accordingly. It is of utmost importance to receive clarity on this issue.	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	The data on Figure 9.9, 9.10 and 9.11 covers the whole study area. It is not corridor specific and is meant to present back-ground information. This portion of the corridors has, however, not been recommended for further



Comments/ Questions	Date received	Origin	Responses
			consideration as part of any of the alternatives.
<p>r) These same comments are applicable to other reports, including the iPhiva Substation placements in the iPhiva MTS Draft Scoping Report. Substation sites that are indicated on Senekal Familie Boerdery's land were never offered as such or are incorrectly indicated. With the documents reaching application status this urgently needs to be corrected lest it is placed on record as correct. Despite us pointing this out to Eskom several times it is being ignored, leading us to believe that Eskom is acting in bad faith with the application by writing off our comments as a mistake on their part, yet still including it in the applications. We deserve clarity on the issue.</p>	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	
<p>s) As far as the minutes document regarding the meeting at Ghost Mountain (29032017) in which Mrs Shinga clearly stated that the addition of line C-G was a mistake, this is not reflected in the minutes and therefore this document is also factually incorrect. I did ask for the C-G to be removed, to which Mrs Shinga responded that Eskom will comply to our request of removing their</p>	08 October 2017	Mr Charl Senekal Senekal Familie Boerdery	



Comments/ Questions	Date received	Origin	Responses
<p>mistake, yet this was not minuted. The glaring omission of discussing option C-G in any report creates confusion as to why it is included on all maps, yet never discussed or ranked in the Nako Iliso reports? Seeing that we are reaching application status this option needs to be clearly addressed as it influences every published report. It is clearly stated in the minutes that the connection between sites C and the existing line can be removed, thereby creating the impression by implication that corridor C-G is not viable seeing that other lines will be removed along this section, but never is the no-go option for C-G stated in any document. We would like to obtain clarity on this issue.</p>			
<p>t) The only report where we find reference to route C-G (albeit not clearly stated) was in the Digby Wells Fauna and Flora Baseline Input report, correctly classifying line C-G as a major impact with high sensitivity. This report, however, does not list the fact that Zimanga will be proclaimed as a Protected Area in the next few months, and rates its Protected Area impact sensitivity as low despite the EKZNW Board having taken the decision that the reserve be proclaimed as a nature reserve with the</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	



Comments/ Questions	Date received	Origin	Responses
<p>highest level of protection. The NPAES sensitivity table 2.11 does not take into account that Zimanga is the only remaining link between all other protected areas within this part of the province, and incorrectly states the routes C-G as no interaction and low sensitivity, despite it being among the highest levels of sensitivity in the province. This needs to be addressed before final application. The NPAES of line C-B is rated as high, but despite proposed lines C-G and C-D occurring on the exact same game reserve with the exact same constraints that pertain to line B-C the impact of these routes are rated as low.</p> <p>The report therefore contradicts itself. We would like to place on record that this entire section C-G runs through the middle of Zimanga Private Game Reserve and will literally cut the reserve in half, together with associated habitat destruction, critically endangered species nest destruction, destroying a wetland registered as of National Importance and destroy the entire business and livelihoods of employees on the game reserve</p>			
<p>u) The only report where we find reference to route C-G (albeit not clearly stated) was in the Digby Wells Fauna and Flora</p>	<p>08 October 2017</p>	<p>Mr Charl Senekal Senekal Familie Boerdery</p>	



Comments/ Questions	Date received	Origin	Responses
<p>Baseline Input report, correctly classifying line C-G as a major impact with high sensitivity. This report, however, does not list the fact that Zimanga will be proclaimed as a Protected Area in the next few months, and rates its Protected Area impact sensitivity as low despite the EKZNW Board having taken the decision that the reserve be proclaimed as a nature reserve with the highest level of protection. The NPAES sensitivity table 2.11 does not take into account that Zimanga is the only remaining link between all other protected areas within this part of the province, and incorrectly states the routes C-G as no interaction and low sensitivity, despite it being among the highest levels of sensitivity in the province. This needs to be addressed before final application. The NPAES of line C-B is rated as high, but despite proposed lines C-G and C-D occurring on the exact same game reserve with the exact same constraints that pertain to line B-C the impact of these routes are rated as low. The report therefore contradicts itself. We would like to place on record that this entire section C-G runs through the middle of Zimanga Private Game</p>			



Comments/ Questions	Date received	Origin	Responses
<p>Reserve and will literally cut the reserve in half, together with associated habitat destruction, critically endangered species nest destruction, destroying a wetland registered as of National Importance and destroy the entire business and livelihoods of employees on the game reserve</p>			
<p>She submitted the following comments:</p> <ul style="list-style-type: none"> • She generally supports the specialist studies proposed. • The technical reason for discarding some of the Iphiva Substation sites is not clear in the report. I will edit this to provide clarity (i.e. if the substation is located too far from the area that is being supplied with electricity, then the losses of current to distributing the electricity from the substation to the end user is unacceptably large. • Besides the point above, her other comments do not require any changes to the Scoping Reports, but are rather for consideration in the specialist studies and impact assessment. • She would have preferred to see more alternatives being taken through to the specialist studies and Impact Assessment phase, but acknowledges the 2014 Regulations that imply only one site/corridor is “approved” in Scoping and 	<p>17 October 2017</p>	<p>Ms Dinesree Thambu Ezemvelo KZN Wildlife Telephonic Submission</p>	<p>These comments were acknowledged. At the time of submission of Final Scoping Report, the discussions and proposals for a meeting date with EKZNW was in progress.</p>



Comments/ Questions	Date received	Origin	Responses
<p>accepts the two that we have. She suspects similar comments from other colleagues. We will address them as they arise. We discussed the possibility of introducing additional totally new sites, but, as this would require re-doing or revising the Scoping Report, it was not pursued.</p> <ul style="list-style-type: none"> • She recommended that we meet with them again to discuss the Hluhluwe-Umfolozi Park and associated Biodiversity Economy Nodes that are being discussed in the Department. I welcomed this meeting, and we will agree on a mutually suitable date. Relevant specialists (ecology, avifauna, social, economic?) will be invited to attend this meeting. 			

Table 8-4: Comments submitted post Final Scoping Report Submission/Finalisation

Comments/ Questions	Date received	Origin/Name/Property Details	Responses
<p>1. The maps on the Environmental Impact Report must illustrate:</p> <ol style="list-style-type: none"> The environmental sensitivities identified superimposed onto the proposed corridor alignments; and Existing powerlines, existing powerline servitudes, existing pipelines and roads. The proposed powerline should be on existing disturbances as far as 	23 October 2017	Ms Dinesree Thambu Principal Planner Ezemvelo KZN Wildlife (EKZNW)	<p>These comments from EKZNW were acknowledged with thanks.</p> <p>1 (a) The request was noted for the Draft EIR compilation.</p> <p>1 (b) This comment was noted. The proposed infrastructure will follow areas which are already disturbed, where practically possible.</p>



Comments/ Questions	Date received	Origin/Name/Property Details	Responses
<p>possible to reduce impacts.</p> <p>2. The .shp files in decimal degrees or. kml files for the existing powerlines must be provided to Ezemvelo when the EIAR is ready for review.</p> <p>3. Contact be made with Bat Interest Group of KwaZulu-Natal, for local bat info: Kate Richardson ejrichardson@worldonline.co.za</p> <p>4. Local experts (for all ecological, fauna and flora specialist studies) be consulted, given that the specialists appointed to undertake the assessment are not from KwaZulu-Natal; and</p> <p>5. A meeting be held to discuss the Hluhluwe-Imfolozi Park and associated Biodiversity Economy nodes that is currently being discussed within our offices. This meeting should be attended by relevant specialists (e.g. ecology, avifauna, social, economic) so that appropriate questions can be raised and addressed, and that contacts can be made to source local information.</p>			<ol style="list-style-type: none"> 1. The format of shapefiles was noted for future submissions, including Draft EIR. 2. This information was provided to the Faunal Specialist. 3. Kate Richardson was contacted on the 18/12/2017 for comment, she advised she is no longer with the KZN bat group. The final specialist report will be circulated for comment to the rest of the Bat Group. 4. A meeting was held with EKZNW to discuss the Hluhluwe-Imfolozi Park and associated Biodiversity Economy nodes on 08 November 2017. A record of comments raised is also captured in this Comments and Responses Report.
<p>Avifauna within the Iphiva-Duma proposed corridors appears to be a red flag. It needs the input of specialist studies.</p> <p>Ms Longmore advised that it</p>	<p>08 November 2017</p>	<p>Ms Jenny Longmore EKZNW FGM</p>	<p>Ms Calmeyer indicated that an Avifaunal Specialist was appointed to conduct specialist studies for the proposed project. Mr Gounden</p>



Comments/ Questions	Date received	Origin/Name/Property Details	Responses
<p>would be preferable for the project to be implemented as far away from the Park as possible as there are also international obligations to be met in responsibly conserving the Park. There is also a 5km de facto buffer around the Park that automatically triggers an EIA, and the site for the Duma Substation which already has environmental authorisation is well within the 5km buffer, and the western corridor of Iphiva-Duma is also within the 5km buffer.</p>			<p>further stated that noise and visual diverters are usually placed on the powerlines to deter the birds from flying into them.</p>
<p>Ms Longmore asked if Iphiva-Duma east and west corridors were the only options for the powerlines to traverse without affecting HiP and its surroundings?</p>	<p>08 November 2017</p>	<p>Ms Jenny Longmore EKZNW FGM</p>	<p>Ms Calmeyer indicated that Eskom needs as short a route as possible to get the powerlines from Iphiva to Duma substation to minimize costs. Protected areas such as Manyoni Private Game Reserve and HiP were avoided at all costs although a compromise needs to be established because ultimately, a solution with the least impacts needs to be identified.</p>
<p>Ms Thambu indicated that EKZNW has noted that all the specialists appointed for the project are not from KZN, hence it is advised that the project specialists engage with EKZNW local specialists before finalizing their specialist reports.</p>	<p>08 November 2017</p>	<p>Ms Dinesree Thambu EKZNW FGM</p>	<p>Ms Calmeyer indicated that the project specialists are chasing a tight submission deadline as the project timeline generally has tight deadlines. Ms Longmore suggested that an extension can be requested from national DEA for submission so</p>



Comments/ Questions	Date received	Origin/Name/Property Details	Responses
			<p>that the necessary studies are conducted thoroughly because the study area is quite extensive.</p> <p>Ms Calmeyer stated that national DEA denied providing an extension for the Scoping Phase according to the 50-day clause. Hence, the final Scoping Report for the project has been submitted.</p>

9 Recommendations

This report discusses in detail the various options with regards to the transmission lines, substations and distribution lines.

The primary concern of this report is to identify and mitigate the potential negative impacts that may arise from the construction and operation of the proposed infrastructure. The various alignment options and infrastructure placement options are all considered in order for the impact to be mitigated as far as possible.

During specialist focus group meetings additional data was sourced from various stakeholders, including Ezemvelo KZN Wildlife, with specific reference to Vultures. This information together with provincial biodiversity data was used to rate options of the transmission lines. The assessment was supplemented with screening level field work to rate the distribution lines and substations specifically. From this assessment it was found that none of the transmission line routes are free of interactions with protected areas or SSC avifauna species.

The distribution lines considers only one variation available, here the line orientation over impacted areas was preferred. It was found that this specific area was home to White Backed Vulture (*Gyps africanus*) (CR), Lappet Faced Vulture (*Torgos tracheliotos*) (EN) and Bateleur (*Terathopius ecaudatus*) (NT) nesting sites. As for the preferred tower designs, please refer to Technical Bulletin: 03TB-026.

The aim of this bulletin is to identify designs that constitute a risk of electrocution to vultures, based on field research by Eskom and the Endangered Wildlife Trust. This bulletin should be read in conjunction with the vulture electrocution risk areas map D DT 7950 for context.

The avoidance of electrocution of birds can be managed by adhering to Technical Bulletin 02TB 023, *Covering of jumpers on MV auxiliary structures*.

The sub-station alternative that was preferred was the one that covered disturbed vegetation/habitat.

All options are within the buffer zone of officially protected areas, more specifically the Hluhluwe–iMfolozi National Park is affected by all 3 western options and the Zululand Rhino Reserve, Thanda Private Game Reserve, Mduna Royal Game Reserve and Hluhluwe–iMfolozi National Park that affects the Eastern option.

This impact is exasperated by the possible impact the Iphiva-Duma East will have on the Black Rhino Range expansion (BREP) and the Ophathe-HiP-Fundimvelo link. Both of these initiatives are planned to be located east of the Duma substation and the transmission line will cross over these.

South African Hunters and Game Conservation Association and Ezemvelo KZN Wildlife initiated a process to develop the Umfolozi Biodiversity Economy Node in 2014. It consists of the Hluhluwe iMfolozi protected areas and the eMhakosini-Ophathe Heritage Park as the core conservation areas. The proposed Iphiva-Duma East and West corridor options are within this economy node.

The expansion strategy of the Hluhluwe iMfolozi park is currently investigating options for expansion, the transmission lines could have an impact on these plans, these impacts can be investigated further during future studies, if the current report has not addressed all of them in sufficient detail.

Final alignment within the preferred corridors must be proceeded by a detailed walk down of the transmission line route, and areas of interest such as, SSC nesting and dispersion locations. Sensitive landscapes (wetlands, ridges where SSC could nest) must be noted and the most appropriate mitigation measures employed to avoid negative impacts.

The following mitigation measures are recommended:

- A suitable qualified avifauna specialist must undertake a walkthrough of the servitudes once the tower positions have been identified in order to determine the presence of any nesting sites of bird species of special concern within or in close proximity to the towers.
- The avifauna specialist should identify the stretches of the powerlines that require bird diverters. These must be added to the profiles in the EMPr.
- Reflectors with LED lights are recommended particularly close to nesting sites and in areas in relatively close proximity to water or wetlands;
- Where powerlines are constructed in parallel, pylons should preferably be positioned so as to alternate with those of the existing power line (i.e. out- of-step) and not be placed opposite one another (in-step). This mitigation will increase the visibility of



both sets of power lines to flying large raptors and the birds may then be in a better position to take timely collision avoidance action;

- Where the possibility or risk of a 'flash-over' occurs additional mitigation measures that increase the visibility of the powerline should be instituted.
- Ensure tower design and type is best for preventing the electrocution of birds and discourages the roosting of birds on the structures; and
- Suitable bird repelling structures (anti-roosting spikes) must be considered in the design, particularly for the cross arms of the tower structures in areas of heavy bird activity (such as wetlands and vulture nesting grounds and vulture restaurants).

Please refer to Technical Bulletin 240-93563150, *Utilization of Bird Flight Diverters on Eskom Overhead Lines*, for specific specifications on bird diverters.

9.1 Mitigation measures and management

Mitigation measures as discussed in the impact assessment section of this report must be central to all environmental management measures. Off sets are designed to mitigate the residual impact the project will have, in order for the project to achieve a Net Positive Impact on biodiversity.

The question of Off-Sets revolves around significant residual impact on threatened habitat/vegetation types, and not species, in this impact assessment we have shown residual impact but not a significant residual impact. Furthermore, the possible residual impact that is demonstrated in this report is with regards to Vultures and other large bodied birds, not threatened vegetation types. Because of this we are applying best practice and suggesting the collaboration with NGO's and KZN wildlife in conservation positive projects to enhance large avifauna conservation and minimise large avifauna impacts.

The collaboration will address the residual impact and will lead towards achieving a Net Positive Impact on impacted species.

9.1.1 Avoidance

As no infrastructure placement or construction has taken place, this measure must be completed during the detailed walkdown to avoid any SSC habitat, this is central to addressing the impacts on critically endangered vulture species present. Furthermore, as the greatest threat to avifauna is collisions and electrocutions the avoidance of this impact must be a priority through mitigation measures discussed above.

9.1.2 Minimisation

The loss of habitat as a direct result of the infrastructure placement is one of the largest impacts. The primary option for mitigating this impact is to define set-asides within the corridors area to be maintained as natural areas.



9.1.3 Rehabilitation

As much of the infrastructure is permanent, and cannot be rehabilitated, rehabilitation is not an option for meeting No Net Loss requirements for the study.

9.1.4 Offsets

As there are residual impacts to SSC, remaining after following the mitigation hierarchy to this point, off sets must be investigated. An offsets study is required for this project to determine the best possible manner in which to ensure measurable No Net Loss/Gain for the project in terms of Biodiversity.

Off-Sets revolve around significant residual Impact to threatened habitat/vegetation types, and not species, in this Impact assessment it was discussed that residual impact but not significant residual impact does exist. Furthermore, the possible residual impact demonstrated in the report, would be towards Vultures and other large bodied birds, not vegetation types, which means at this stage one can't quantify actual impact as of yet, for this reason we are applying best practice and suggesting the collaboration with NGO's and KZN wildlife in conservation positive projects to enhance large avifauna conservation and minimise large avifauna impacts.

The collaboration will address the residual impact and will lead towards achieving a Net Positive Impact on impacted species.

10 Conclusion

This report accepts the economic need of the Eskom expansion and is in support of this strategy. The aim of this report is to comply with Appendix 6 of GN 326 of 7 April 2017, and all Provincial and National environmental legislation with regards to Avifauna and general biodiversity when describing the activity and the impact that will have on the natural environment. It has been demonstrated that certain areas of the proposed infrastructure have very high impacts on the Avifauna SSC in that project area.

A more detailed assessment (tower locations) is needed to quantify this impact further after detailed field investigations, and to aid in making decisions such as infrastructure placement. The mitigation measures prescribed in this report must be implemented correctly and timeously, in order for the identified impacts to be addressed.

With the historic success that the mitigation measure has had on previous projects, the main issues can be mitigated to an acceptable level. In this case the project can go ahead.





12 References

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Appendix A: CV

Mr. Philip David Patton

Associate (Environmental Auditor / Biodiversity specialist)

Education

1994 A-Levels (Matric); Woodridge College, Eastern Cape

1997 B.Sc. (Geology and Botany): University of Port Elizabeth

1998 B.Sc. (Honours) (Environmental and Geographical Science): University of Cape Town

Language Skills

English

Employment

2013 – 2016: Digby Wells Environmental: Associate

2007 – Present: Gauteng Asphalt: Contracted Environmental Auditor

2007 – Present: ESS (Pty) Ltd.: Contracted Environmental Auditor and Biodiversity Specialist

Sep 2007 – Sep 2012 Islands in Africa: Managing Director (Safari Lodge operator in Namibia)

Dec 2004 – 2007 Mahlatini LTD – Proprietor and Managing Director (Ireland)

May 2002 – May 2004 ENSR International (RSK ENSR Group), London - UK, Senior Environmental Consultant / Auditor

December 1998 – March 2002 Groundwater Consulting Services (GCS), RSA Environmental Consultant, Staff Hydrogeologist

November 1997 – February 1998 Welgedaght Coal Mine, Billiton, RSA (Student)

Experience

- Environmental Auditing (Due Diligence, Compliance), IEMA London.
- Environmental Management (EMP's, EIA's, EMPR's)
- Project Management
- Terrestrial Ecology: Fauna and Flora Specialist – Southern and East Africa

Selected project experience

EIA/EMP/Biodiversity assessments:

2015, Feronia PHC, DRC, Congo Basin Ecological Assessment

2014, Anglo Coal, Daleyshope, Environmental Impact Assessment

2014, Anker Coal, Elandfontein, Ecological Survey and Rehabilitation Plan

2013, Harmony Gold, Kalgold Mine, Mafeking, Fauna and Flora investigation

2013, Tumela Shaft 5, Anglo Platinum, Thabazimbi, Fauna and Flora investigation

2012, Iyanga Mining (Pty) Ltd. Welgelegen Opencast Mine, EIA/EMP

2012, Chika Groundwater cc, Kromkrans Opencast mine, Terrestrial Ecology Assessment

2011, Bawessels (Pty) Ltd. Zevenfontein Opencast Mine, EIA/EMP

2011, Universal Pulse Trading 132 (Pty) Ltd. Alexander Underground Mine, EIA/EMP

International Environmental Due Diligence Audits:

Jan, 2003: SLI, Glasgow (Light bulb manufacturing), **Scotland**

July, 2003: Beach Profiling and oil damage remediation, **Kuwait**

Dec, 2003 Framatome Building (Commercial high-rise), Paris, **France**

Nov, 2003 Schoellar Plast, Gyor (Injection molding), **Hungary**

Oct, 2003, Adams, Beirut (confectionary factory), **Lebanon**

Sep, 2003, Formy Tachov (construction and mould manufacturing company), **Czech Republic**

June, 2004, Liffe (TIAA) Financial building, London, **UK**

Dec, 2004 Kimberly Clarke and Cobra Watertech, **South Africa**, (with ENSR United Kingdom)

Environmental Compliance Audits:

2007- Present: Gauteng Asphalt Full EMP bi annual audits. Johannesburg. R.S.A.

2002, Dwars River Chrome Mine, South Africa, (Construction and operational phase audits)



2001, Haasfontein Colliery (F&T Pty Ltd), South Africa, (Construction and operational phase audits according to ISO 14001)

2000, Techold Chemical Factory EMP, South Africa

2005, Valspar HSE compliance in association with ENSR United States

2001, Two Rivers Platinum, (Avmin), South Africa, (Bulk Sample and rehabilitation)

Professional affiliations

2002 – 2004 EARA (Environmental Auditor – UK)

Professional Registration

Pr. Sci. Nat. (SACNASP 2012)



Appendix B: Expected and Confirmed Avifauna

Common Name and family	Scientific name	IUCN Status
ANSERIFORMES: Anatidae		
White-faced Whistling Duck	<i>Dendrocygna viduata</i>	
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	
Maccoa Duck	<i>Oxyura maccoa</i>	Near-threatened
Egyptian Goose	<i>Alopochen aegyptiaca</i>	
South African Shelduck	<i>Tadorna cana</i>	
Southern Pochard	<i>Netta erythrophthalma</i>	
Hottentot Teal	<i>Spatula hottentota</i>	
Cape Shoveler	<i>Spatula smithii</i>	
African Black Duck	<i>Anas sparsa</i>	
Yellow-billed Duck	<i>Anas undulata</i>	
Cape Teal	<i>Anas capensis</i>	
Red-billed Teal	<i>Anas erythrorhyncha</i>	
White-backed Duck	<i>Thalassornis leuconotus</i>	
Spur-winged Goose	<i>Plectropterus gambensis</i>	
Comb Duck	<i>Sarkidiornis melanotos</i>	
African Pygmy Goose	<i>Nettapus auritus</i>	
GALLIFORMES: Numididae		
Helmeted Guineafowl	<i>Numida meleagris</i>	
Crested Guineafowl	<i>Guttera pucherani</i>	
GALLIFORMES: Phasianidae		
Common Quail	<i>Coturnix coturnix</i>	
Harlequin Quail	<i>Coturnix delegorguei</i>	
Natal Francolin	<i>Pternistis natalensis</i>	
Red-necked Spurfowl	<i>Pternistis afer</i>	
Swainson's Francolin	<i>Pternistis swainsonii</i>	
Crested Francolin	<i>Dendroperdix sephaena</i>	
Coqui Francolin	<i>Peliperdix coqui</i>	
Red-winged Francolin	<i>Scleroptila levaillantii</i>	
Grey-winged Francolin	<i>Scleroptila afra</i>	Endemic (country/region)
Shelley's Francolin	<i>Scleroptila shelleyi</i>	
PHOENICOPTERIFORMES: Phoenicopteridae		



Greater Flamingo	<i>Phoenicopterus roseus</i>	
Lesser Flamingo	<i>Phoeniconaias minor</i>	Near-threatened
PHOENICOPTERIFORMES: Podicipedidae		
Little Grebe	<i>Tachybaptus ruficollis</i>	
Great Crested Grebe	<i>Podiceps cristatus</i>	
Black-necked Grebe	<i>Podiceps nigricollis</i>	
COLUMBIFORMES: Columbidae		
Rock Dove	<i>Columba livia</i>	Introduced species
Speckled Pigeon	<i>Columba guinea</i>	
African Olive Pigeon	<i>Columba arquatrix</i>	
Lemon Dove	<i>Aplopelia larvata</i>	
Red-eyed Dove	<i>Streptopelia semitorquata</i>	
Cape Turtle Dove	<i>Streptopelia capicola</i>	
Laughing Dove	<i>Streptopelia senegalensis</i>	
African Green Pigeon	<i>Treron calvus</i>	
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	
Tambourine Dove	<i>Turtur tympanistria</i>	
Namaqua Dove	<i>Oena capensis</i>	
CAPRIMULGIFORMES: Caprimulgidae		
European Nightjar	<i>Caprimulgus europaeus</i>	
Rufous-cheeked Nightjar	<i>Caprimulgus rufigena</i>	Rare/Accidental
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>	
Swamp Nightjar	<i>Caprimulgus natalensis</i>	
Freckled Nightjar	<i>Caprimulgus tristigma</i>	
Mozambique Nightjar	<i>Caprimulgus fossii</i>	
Pennant-winged Nightjar	<i>Caprimulgus vexillarius</i>	Rare/Accidental
CAPRIMULGIFORMES: Apodidae		
Mottled Spinetailed Swift	<i>Telacanthura ussheri</i>	
African Palm Swift	<i>Cypsiurus parvus</i>	
Alpine Swift	<i>Tachymarptis melba</i>	
White-rumped Swift	<i>Apus caffer</i>	
Horus Swift	<i>Apus horus</i>	
Little Swift	<i>Apus affinis</i>	
African Swift	<i>Apus barbatus</i>	
Common Swift	<i>Apus apus</i>	



CUCULIFORMES: Cuculidae		
White-browed Coucal	<i>Centropus superciliosus</i>	
African Black Coucal	<i>Centropus grillii</i>	
Green Coucal	<i>Ceuthmochares aereus</i>	
Jacobin Cuckoo	<i>Clamator jacobinus</i>	
Levaillant's Cuckoo	<i>Clamator levaillantii</i>	
Great Spotted Cuckoo	<i>Clamator glandarius</i>	
Thick-billed Cuckoo	<i>Pachycoccyx audeberti</i>	
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	
African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	
Diederick Cuckoo	<i>Chrysococcyx caprius</i>	
Red-chested Cuckoo	<i>Cuculus solitarius</i>	
Black Cuckoo	<i>Cuculus clamosus</i>	
Common Cuckoo	<i>Cuculus canorus</i>	
African Cuckoo	<i>Cuculus gularis</i>	
Lesser Cuckoo	<i>Cuculus poliocephalus</i>	Rare/Accidental
Madagascar Cuckoo	<i>Cuculus rochii</i>	Rare/Accidental
GRUIFORMES: Rallidae		
African Rail	<i>Rallus caerulescens</i>	
African Crake	<i>Crex egregia</i>	
Corncrake	<i>Crex crex</i>	
Black Crake	<i>Zapornia flavirostra</i>	
Baillon's Crake	<i>Zapornia pusilla</i>	
Purple Swamphen	<i>Porphyrio porphyrio</i>	
Allen's Gallinule	<i>Porphyrio alleni</i>	
Common Moorhen	<i>Gallinula chloropus</i>	
Lesser Moorhen	<i>Gallinula angulata</i>	
Red-knobbed Coot	<i>Fulica cristata</i>	
GRUIFORMES: Sarothruridae		
Buff-spotted Flufftail	<i>Sarothrura elegans</i>	
Red-chested Flufftail	<i>Sarothrura rufa</i>	
Striped Flufftail	<i>Sarothrura affinis</i>	
GRUIFORMES: Heliornithidae		
African Finfoot	<i>Podica senegalensis</i>	
GRUIFORMES: Gruidae		



Grey Crowned Crane	<i>Balearica regulorum</i>	Endangered
Wattled Crane	<i>Grus carunculata</i>	Vulnerable
Blue Crane	<i>Grus paradisea</i>	Vulnerable
OTIDIFORMES: Otididae		
Black-bellied Bustard	<i>Lissotis melanogaster</i>	
Kori Bustard	<i>Ardeotis kori</i>	Near-threatened
Red-crested Bustard	<i>Lophotis ruficrista</i>	
White-bellied Bustard	<i>Eupodotis senegalensis</i>	
White-quilled Bustard	<i>Afrotis afraoides</i>	
MUSOPHAGIFORMES: Musophagidae		
Grey Go-away-bird	<i>Corythaixoides concolor</i>	
Purple-crested Turaco	<i>Gallirex porphyreolophus</i>	
PELECANIFORMES: Ciconiidae		
Marabou	<i>Leptoptilos crumenifer</i>	
Yellow-billed Stork	<i>Mycteria ibis</i>	
African Openbill	<i>Anastomus lamelligerus</i>	
Black Stork	<i>Ciconia nigra</i>	
Abdim's Stork	<i>Ciconia abdimii</i>	Rare/Accidental
Woolly-necked Stork	<i>Ciconia episcopus</i>	
European White Stork	<i>Ciconia ciconia</i>	
Saddle-bill Stork	<i>Ephippiorhynchus senegalensis</i>	
PELECANIFORMES: Pelecanidae		
Great White Pelican	<i>Pelecanus onocrotalus</i>	
Pink-backed Pelican	<i>Pelecanus rufescens</i>	
PELECANIFORMES: Scopidae		
Hamerkop	<i>Scopus umbretta</i>	
PELECANIFORMES: Ardeidae		
Little Bittern	<i>Ixobrychus minutus</i>	
Dwarf Bittern	<i>Ixobrychus sturmii</i>	
White-backed Night Heron	<i>Gorsachius leuconotus</i>	
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	
Squacco Heron	<i>Ardeola ralloides</i>	
Rufous-bellied Heron	<i>Ardeola rufiventris</i>	



Cattle Egret	<i>Bubulcus ibis</i>	
Grey Heron	<i>Ardea cinerea</i>	
Black-headed Heron	<i>Ardea melanocephala</i>	
Goliath Heron	<i>Ardea goliath</i>	
Purple Heron	<i>Ardea purpurea</i>	
Great Egret	<i>Ardea alba</i>	
Intermediate Egret	<i>Ardea intermedia</i>	
Black Heron	<i>Egretta ardesiaca</i>	
Slaty Egret	<i>Egretta vinaceigula</i>	Vulnerable
Little Egret	<i>Egretta garzetta</i>	
PELECANIFORMES: Threskiornithidae		
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	
African Spoonbill	<i>Platalea alba</i>	
Hadada Ibis	<i>Bostrychia hagedash</i>	
Glossy Ibis	<i>Plegadis falcinellus</i>	
PELECANIFORMES: Phalacrocoracidae		
Reed Cormorant	<i>Microcarbo africanus</i>	
White Breasted Cormorant	<i>Phalacrocorax carbo</i>	
PELECANIFORMES: Anhingidae		
African Darter	<i>Anhinga rufa</i>	
CHARADRIFORMES: Burhinidae		
Water Thick-knee	<i>Burhinus vermiculatus</i>	
Spotted Thick-knee	<i>Burhinus capensis</i>	
CHARADRIIFORMES: Recurvirostridae		
Pied Avocet	<i>Recurvirostra avosetta</i>	
Black-winged Stilt	<i>Himantopus himantopus</i>	
CHARADRIIFORMES: Charadriidae		
Common Ringed Plover	<i>Charadrius hiaticula</i>	
Kittlitz's Plover	<i>Charadrius pecuarius</i>	
Three-banded Plover	<i>Charadrius tricollaris</i>	
White-fronted Plover	<i>Charadrius marginatus</i>	
Chestnut-banded Plover	<i>Charadrius pallidus</i>	Near-threatened
Caspian Plover	<i>Charadrius asiaticus</i>	Rare/Accidental
Long-toed Lapwing	<i>Vanellus crassirostris</i>	



Blacksmith Lapwing	<i>Vanellus armatus</i>	
Senegal Lapwing	<i>Vanellus lugubris</i>	
Black-winged Lapwing	<i>Vanellus melanopterus</i>	
Crowned Lapwing	<i>Vanellus coronatus</i>	
African Wattled Lapwing	<i>Vanellus senegallus</i>	
CHARADRIIFORMES: Rostratulidae		
Greater Painted-snipe	<i>Rostratula benghalensis</i>	
CHARADRIIFORMES: Jacanidae		
African Jacana	<i>Actophilornis africanus</i>	
Lesser Jacana	<i>Microparra capensis</i>	
CHARADRIIFORMES: Scolopacidae		
Ruff	<i>Calidris pugnax</i>	
Curlew Sandpiper	<i>Calidris ferruginea</i>	
Little Stint	<i>Calidris minuta</i>	
African Snipe	<i>Gallinago nigripennis</i>	
Terek Sandpiper	<i>Xenus cinereus</i>	
Common Sandpiper	<i>Actitis hypoleucos</i>	
Green Sandpiper	<i>Tringa ochropus</i>	Rare/Accidental
Common Greenshank	<i>Tringa nebularia</i>	
Common Redshank	<i>Tringa totanus</i>	Rare/Accidental
Wood Sandpiper	<i>Tringa glareola</i>	
Marsh Sandpiper	<i>Tringa stagnatilis</i>	
CHARADRIIFORMES: Turnicidae		
Common Buttonquail	<i>Turnix sylvaticus</i>	
Black-rumped Buttonquail	<i>Turnix hottentottus</i>	
CHARADRIIFORMES: Glareolidae		
Bronze-winged Courser	<i>Rhinoptilus chalcopterus</i>	
Burchell's Courser	<i>Cursorius rufus</i>	
Temminck's Courser	<i>Cursorius temminckii</i>	
Collared Pratincole	<i>Glareola pratincola</i>	
Black-winged Pratincole	<i>Glareola nordmanni</i>	Rare/Accidental Near-threatened
CHARADRIIFORMES: Laridae		
African Skimmer	<i>Rynchops flavirostris</i>	Rare/Accidental Near-threatened



Gray-hooded Gull	<i>Chroicocephalus cirrocephalus</i>	
Whiskered Tern	<i>Chlidonias hybrida</i>	
White-winged Tern	<i>Chlidonias leucopterus</i>	
ACCIPITRIFORMES: Sagittariidae		
Secretary-bird	<i>Sagittarius serpentarius</i>	Vulnerable
ACCIPITRIFORMES: Pandionidae		
Osprey	<i>Pandion haliaetus</i>	
ACCIPITRIFORMES: Accipitridae		
Black-shouldered Kite	<i>Elanus caeruleus</i>	
European Honey Buzzard	<i>Pernis apivorus</i>	
African Cuckoo Hawk	<i>Aviceda cuculoides</i>	
African Harrier Hawk	<i>Polyboroides typus</i>	
Palm-nut Vulture	<i>Gypohierax angolensis</i>	
Bateleur	<i>Terathopius ecaudatus</i>	Near-threatened
Black-chested Snake Eagle	<i>Circaetus pectoralis</i>	
Brown Snake Eagle	<i>Circaetus cinereus</i>	
Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	Near-threatened
White-headed Vulture	<i>Trigonoceps occipitalis</i>	Vulnerable
Hooded Vulture	<i>Necrosyrtes monachus</i>	Rare/Accidental Endangered
White-backed Vulture	<i>Gyps africanus</i>	Endangered
Cape Vulture	<i>Gyps coprotheres</i>	Vulnerable
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	Endangered
Bat Hawk	<i>Macheiramphus alcinus</i>	
Crowned Eagle	<i>Stephanoaetus coronatus</i>	Near-threatened
Martial Eagle	<i>Polemaetus bellicosus</i>	Vulnerable
Long-crested Eagle	<i>Lophaetus occipitalis</i>	
Lesser Spotted Eagle	<i>Clanga pomarina</i>	
Tawny Eagle	<i>Aquila rapax</i>	Vulnerable in SA
Steppe Eagle	<i>Aquila nipalensis</i>	
Verreaux's Eagle	<i>Aquila verreauxii</i>	
African Hawk Eagle	<i>Aquila spilogaster</i>	
Wahlberg's Eagle	<i>Hieraaetus wahlbergi</i>	
Booted Eagle	<i>Hieraaetus pennatus</i>	
Ayres's Eagle	<i>Hieraaetus ayresii</i>	
Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	
Dark Chanting Goshawk	<i>Melierax metabates</i>	Rare/Accidental



Pale Chanting Goshawk	<i>Melierax canorus</i>	Rare/Accidental
Gabar Goshawk	<i>Micronisus gabar</i>	
Western Marsh Harrier	<i>Circus aeruginosus</i>	Rare/Accidental
African Marsh Harrier	<i>Circus ranivorus</i>	Vulnerable in SA
Black Harrier	<i>Circus maurus</i>	Vulnerable
Pallid Harrier	<i>Circus macrourus</i>	Rare/Near-threatened
Montagu's Harrier	<i>Circus pygargus</i>	Rare/Accidental
African Goshawk	<i>Accipiter tachiro</i>	
Shikra	<i>Accipiter badius</i>	
Little Sparrowhawk	<i>Accipiter minullus</i>	
Ovambo Sparrowhawk	<i>Accipiter ovampensis</i>	Rare/Accidental
Rufous-breasted Sparrowhawk	<i>Accipiter rufiventris</i>	
Black Sparrowhawk	<i>Accipiter melanoleucus</i>	
African Fish Eagle	<i>Haliaeetus vocifer</i>	
Black Kite	<i>Milvus migrans</i>	
Jackal Buzzard	<i>Buteo rufofuscus</i>	
Steppe Buzzard	<i>Buteo buteo</i>	
Forest Buzzard	<i>Buteo trizonatus</i>	Endemic (country/region)
STRIGIFORMES: Tytonidae		
African Grass Owl	<i>Tyto capensis</i>	Vulnerable in SA
Common Barn Owl	<i>Tyto alba</i>	
STRIGIFORMES: Strigidae		
Pearl-spotted Owlet	<i>Glaucidium perlatum</i>	
African Barred Owlet	<i>Glaucidium capense</i>	
African Scops Owl	<i>Otus senegalensis</i>	
Southern White-faced Owl	<i>Ptilopsis granti</i>	
Marsh Owl	<i>Asio capensis</i>	
African Wood Owl	<i>Strix woodfordii</i>	
Spotted Eagle Owl	<i>Bubo africanus</i>	
Verreaux's Eagle Owl	<i>Bubo lacteus</i>	
Pel's Fishing Owl	<i>Scotopelia peli</i>	
COLIIFORMES: Coliidae		
Speckled Mousebird	<i>Colius striatus</i>	
White-backed Mousebird	<i>Colius colius</i>	Rare/Accidental
Red-faced Mousebird	<i>Urocolius indicus</i>	
TROGONIFORMES: Trogonidae		



Narina's Trogon	<i>Apaloderma narina</i>	
BUCEROTIFORMES: Bucerotidae		
Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	Vulnerable
Crowned Hornbill	<i>Tockus albiterminatus</i>	
African Grey Hornbill	<i>Tockus nasutus</i>	
Red-billed Hornbill	<i>Tockus erythrorhynchus</i>	
Southern Yellow-billed Hornbill	<i>Tockus leucomelas</i>	
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	
BUCEROTIFORMES: Upupidae		
Common Hoopoe	<i>Upupa epops</i>	
BUCEROTIFORMES: Phoeniculidae		
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	
Common Scimitarbill	<i>Rhinopomastus cyanomelas</i>	
PICIFORMES: Indicatoridae		
Brown-backed Honeybird	<i>Prodotiscus regulus</i>	
Lesser Honeyguide	<i>Indicator minor</i>	
Scaly-throated Honeyguide	<i>Indicator variegatus</i>	
Greater Honeyguide	<i>Indicator indicator</i>	
PICIFORMES: Picidae		
Red throated Wryneck	<i>Jynx ruficollis</i>	
Ground Woodpecker	<i>Geocolaptes olivaceus</i>	Endemic (country/region)
Bennett's Woodpecker	<i>Campethera bennettii</i>	
Golden-tailed Woodpecker	<i>Campethera abingoni</i>	
Cardinal Woodpecker	<i>Dendropicus fuscescens</i>	
Bearded Woodpecker	<i>Chloropicus namaquus</i>	
Olive Woodpecker	<i>Mesopicos griseocephalus</i>	
PICIFORMES: Ramphastidae		
Crested Barbet	<i>Trachyphonus vaillantii</i>	
White-eared Barbet	<i>Stactolaema leucotis</i>	
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>	
Black-collared Barbet	<i>Lybius torquatus</i>	



CORACIIFORMES: Meropidae		
White-fronted Bee-eater	<i>Merops bullockoides</i>	
Southern Carmine Bee-eater	<i>Merops nubicoides</i>	
Blue-cheeked Bee-eater	<i>Merops persicus</i>	
European Bee-eater	<i>Merops apiaster</i>	
Swallow-tailed Bee-eater	<i>Merops hirundineus</i>	Rare/Accidental
Little Bee-eater	<i>Merops pusillus</i>	
CORACIIFORMES: Coraciidae		
Purple Roller	<i>Coracias naevius</i>	
Lilac-breasted Roller	<i>Coracias caudatus</i>	
European Roller	<i>Coracias garrulus</i>	Near-threatened
Broad-billed Roller	<i>Eurystomus glaucurus</i>	
CORACIIFORMES: Alcedinidae		
African Pygmy Kingfisher	<i>Ispidina picta</i>	
African Malachite Kingfisher	<i>Corythornis cristatus</i>	
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	Vulnerable in SA
Giant Kingfisher	<i>Megaceryle maxima</i>	
Pied Kingfisher	<i>Ceryle rudis</i>	
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	Rare/Accidental
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	
Striped Kingfisher	<i>Halcyon chelicuti</i>	
Woodland Kingfisher	<i>Halcyon senegalensis</i>	
FALCONIFORMES: Falconidae		
Lesser Kestrel	<i>Falco naumanni</i>	Vulnerable in SA
Common Kestrel	<i>Falco tinnunculus</i>	
Greater Kestrel	<i>Falco rupicoloides</i>	
Red-footed Falcon	<i>Falco vespertinus</i>	Near-threatened
Amur Falcon	<i>Falco amurensis</i>	
Sooty Falcon	<i>Falco concolor</i>	Near-threatened
Eurasian Hobby	<i>Falco subbuteo</i>	
Lanner Falcon	<i>Falco biarmicus</i>	
Peregrine Falcon	<i>Falco peregrinus</i>	
PSITTACIFORMES: Psittacidae		
Cape Parrot	<i>Poicephalus robustus</i>	
Brown-headed Parrot	<i>Poicephalus cryptoxanthus</i>	



PASSERIFORMES: Calyptomenidae		
African Broadbill	<i>Smithornis capensis</i>	
PASSERIFORMES: Campephagidae		
White-breasted Cuckooshrike	<i>Cebilepyris pectoralis</i>	Rare/Accidental
Grey Cuckooshrike	<i>Cebilepyris caesius</i>	
Black Cuckooshrike	<i>Campephaga flava</i>	
PASSERIFORMES: Oriolidae		
Eastern Black-headed Oriole	<i>Oriolus larvatus</i>	
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	
PASSERIFORMES: Platysteiridae		
Cape Batis	<i>Batis capensis</i>	
Woodwards' Batis	<i>Batis fratrum</i>	
Chinspot Batis	<i>Batis molitor</i>	
Black-throated Wattle-eye	<i>Platysteira peltata</i>	
PASSERIFORMES: Vangidae		
White-crested Helmet-shrike	<i>Prionops plumatus</i>	
Retz's Helmet-shrike	<i>Prionops retzii</i>	
PASSERIFORMES: Malaconotidae		
Grey-headed Bush-shrike	<i>Malaconotus blanchoti</i>	
Black-backed Puffback	<i>Dryoscopus cubla</i>	
Brown-crowned Tchagra	<i>Tchagra australis</i>	
Southern Tchagra	<i>Tchagra tchagra</i>	
Black-crowned Tchagra	<i>Tchagra senegalus</i>	
Brubru	<i>Nilaus afer</i>	
Olive Bush-shrike	<i>Chlorophoneus olivaceus</i>	
Orange-breasted Bush-shrike	<i>Chlorophoneus sulfureopectus</i>	
Tropical Boubou	<i>Laniarius aethiopicus</i>	
Southern Boubou	<i>Laniarius ferrugineus</i>	
Crimson-breasted Shrike	<i>Laniarius atrococcineus</i>	Rare/Accidental
Bokmakierie	<i>Telophorus zeylonus</i>	
Gorgeous Bush-shrike	<i>Telophorus viridis</i>	
PASSERIFORMES: Dicruridae		



Square-tailed Drongo	<i>Dicrurus ludwigii</i>	
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	
PASSERIFORMES: Laniidae		
Magpie Shrike	<i>Urolestes melanoleucus</i>	
Red-backed Shrike	<i>Lanius collurio</i>	
Lesser Grey Shrike	<i>Lanius minor</i>	
Southern Fiscal	<i>Lanius collaris</i>	
PASSERIFORMES: Corvidae		
Cape Crow	<i>Corvus capensis</i>	
White-necked Raven	<i>Corvus albicollis</i>	
Pied Crow	<i>Corvus albus</i>	
PASSERIFORMES: Monarchidae		
Blue-mantled flycatcher	<i>Trochocercus cyanomelas</i>	
African Paradise-flycatcher	<i>Terpsiphone viridis</i>	
PASSERIFORMES: Nectariniidae		
Collared Sunbird	<i>Hedydipna collaris</i>	
Olive Sunbird	<i>Cyanomitra olivacea</i>	
Mouse-coloured Sunbird	<i>Cyanomitra verreauxii</i>	
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	
Malachite Sunbird	<i>Nectarinia famosa</i>	
Southern Double-collared Sunbird	<i>Cinnyris chalybeus</i>	
Neergaard's Sunbird	<i>Cinnyris neergaardi</i>	Near-threatened
Greater Double-collared Sunbird	<i>Cinnyris afer</i>	
Marico Sunbird	<i>Cinnyris mariquensis</i>	
Purple-banded Sunbird	<i>Cinnyris bifasciatus</i>	
White-bellied Sunbird	<i>Cinnyris talatala</i>	
PASSERIFORMES: Ploceidae		
Red-billed Buffalo Weaver	<i>Bubalornis niger</i>	
White-browed Sparrow Weaver	<i>Plocepasser mahali</i>	Rare/Accidental
Red-headed Quelea	<i>Quelea erythrops</i>	
Red-billed Quelea	<i>Quelea quelea</i>	
Yellow-crowned Bishop	<i>Euplectes afer</i>	
Red-collared Widowbird	<i>Euplectes ardens</i>	
Southern Red Bishop	<i>Euplectes orix</i>	



Yellow Bishop	<i>Euplectes capensis</i>	
Fan-tailed Widowbird	<i>Euplectes axillaris</i>	
White-winged Widowbird	<i>Euplectes albonotatus</i>	
Long-tailed Widowbird	<i>Euplectes progne</i>	
Spectacled Weaver	<i>Ploceus ocularis</i>	
Cape Weaver	<i>Ploceus capensis</i>	
African Golden Weaver	<i>Ploceus subaureus</i>	
Southern Brown-throated Weaver	<i>Ploceus xanthopterus</i>	
Lesser Masked Weaver	<i>Ploceus intermedius</i>	
Southern Masked Weaver	<i>Ploceus velatus</i>	
Village Weaver	<i>Ploceus cucullatus</i>	
Dark-backed Weaver	<i>Ploceus bicolor</i>	
Red-headed Weaver	<i>Anaplectes rubriceps</i>	
PASSERIFORMES: Estrildidae		
Red-billed Firefinch	<i>Lagonosticta senegala</i>	
Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>	
African Firefinch	<i>Lagonosticta rubricata</i>	
Green-winged Pytilia	<i>Pytilia melba</i>	
Pink-throated Twinspot	<i>Hypargos margaritatus</i>	
Violet-eared Waxbill	<i>Granatina granatina</i>	Rare/Accidental
Blue Waxbill	<i>Uraeginthus angolensis</i>	
Grey Waxbill	<i>Estrilda perreini</i>	
Common Waxbill	<i>Estrilda astrild</i>	
Green-backed Twinspot	<i>Mandingoa nitidula</i>	
Swee Waxbill	<i>Coccygia melanotis</i>	
Red-headed Finch	<i>Amadina erythrocephala</i>	
Cut-throat Finch	<i>Amadina fasciata</i>	
African Quailfinch	<i>Ortygospiza fuscocrissa</i>	
Bronze Mannikin	<i>Spermestes cucullata</i>	
Black-and-white Mannikin	<i>Spermestes bicolor</i>	
Magpie Mannikin	<i>Spermestes fringilloides</i>	
PASSERIFORMES: Viduidae		
Pin-tailed Whydah	<i>Vidua macroura</i>	
Eastern Paradise Whydah	<i>Vidua paradisaea</i>	
Shaft-tailed Whydah	<i>Vidua regia</i>	
Dusky Indigobird	<i>Vidua funerea</i>	
Village Indigobird	<i>Vidua chalybeata</i>	Rare/Accidental
Purple Indigobird	<i>Vidua purpurascens</i>	Rare/Accidental



PASSERIFORMES: Passeridae		
House Sparrow	<i>Passer domesticus</i>	Introduced species
Cape Sparrow	<i>Passer melanurus</i>	
Southern Grey-headed Sparrow	<i>Passer diffusus</i>	
Yellow-throated Bush Sparrow	<i>Gymnoris superciliaris</i>	
PASSERIFORMES: Motacillidae		
Short-tailed Pipit	<i>Anthus brachyurus</i>	
Bushveld Pipit	<i>Anthus caffer</i>	
Striped Pipit	<i>Anthus lineiventris</i>	
Plain-backed Pipit	<i>Anthus leucophrys</i>	
African Pipit	<i>Anthus cinnamomeus</i>	
Buffy Pipit	<i>Anthus vaalensis</i>	
Long-billed Pipit	<i>Anthus similis</i>	
Cape Longclaw	<i>Macronyx capensis</i>	
Yellow-throated Longclaw	<i>Macronyx croceus</i>	
Rosy-breasted Longclaw	<i>Macronyx ameliae</i>	
Yellow-breasted Pipit	<i>Hemimacronyx chloris</i>	Endemic /Vulnerable
Golden Pipit	<i>Tmetothylacus tenellus</i>	Rare/Accidental
Mountain Wagtail	<i>Motacilla clara</i>	
Cape Wagtail	<i>Motacilla capensis</i>	
Yellow Wagtail	<i>Motacilla flava</i>	
African Wagtail	<i>Motacilla aguimp</i>	
Grey Wagtail	<i>Motacilla cinerea</i>	Rare/Accidental
PASSERIFORMES: Fringillidae		
Forest Canary	<i>Crithagra scotops</i>	
Black-throated Canary	<i>Crithagra atrogularis</i>	
Lemon-breasted Canary	<i>Crithagra citrinipectus</i>	
Yellow-fronted Canary	<i>Crithagra mozambica</i>	
Yellow Canary	<i>Crithagra flaviventris</i>	Rare/Accidental
Brimstone Canary	<i>Crithagra sulphurata</i>	
Streaky-headed Canary	<i>Crithagra gularis</i>	
Drakensberg Siskin	<i>Crithagra symonsi</i>	
Cape Canary	<i>Serinus canicollis</i>	
PASSERIFORMES: Emberizidae		
Golden-breasted Bunting	<i>Fringillaria flaviventris</i>	
Cape Bunting	<i>Fringillaria capensis</i>	



Lark-like Bunting	<i>Fringillaria impetuani</i>	Rare/Accidental
Cinnamon-breasted Bunting	<i>Fringillaria tahapisi</i>	
PASSERIFORMES: Stenostiridae		
African Fairy-flycatcher	<i>Stenostira scita</i>	
PASSERIFORMES: Paridae		
Southern Black Tit	<i>Melaniparus niger</i>	
Grey Tit	<i>Melaniparus afer</i>	
Ashy Tit	<i>Melaniparus cinerascens</i>	
PASSERIFORMES: Remizidae		
Grey Penduline Tit	<i>Anthoscopus caroli</i>	
Cape Penduline Tit	<i>Anthoscopus minutus</i>	
PASSERIFORMES: Nicatoridae		
Eastern Nicator	<i>Nicator gularis</i>	
PASSERIFORMES: Alaudidae		
Spike-heeled Lark	<i>Chersomanes albofasciata</i>	
Eastern Long-billed Lark	<i>Certhilauda semitorquata</i>	
Dusky Lark	<i>Pinarocorys nigricans</i>	
Chestnut-backed Sparrow Lark	<i>Eremopterix leucotis</i>	
Sabota Lark	<i>Calendulauda sabota</i>	
Fawn-coloured Lark	<i>Calendulauda africanoides</i>	
Cape Clapper Lark	<i>Mirafra apiata</i>	
Eastern Clapper Lark	<i>Mirafra fasciolata</i>	Rare/Accidental
Rufous-naped Lark	<i>Mirafra africana</i>	
Flappet Lark	<i>Mirafra rufocinnamomea</i>	
Monotonous Lark	<i>Mirafra passerina</i>	Rare/Accidental
Melodious Lark	<i>Mirafra cheniana</i>	Near-threatened
Red-capped Lark	<i>Calandrella cinerea</i>	
PASSERIFORMES: Macrosphenidae		
Long-billed Crombec	<i>Sylvietta rufescens</i>	
Cape Grassbird	<i>Sphenoeacus afer</i>	
PASSERIFORMES: Cisticolidae		
Yellow-bellied Eremomela	<i>Eremomela icteropygialis</i>	
Green-capped Eremomela	<i>Eremomela scotops</i>	



Burnt-necked Eremomela	<i>Eremomela usticollis</i>	
Bar-throated Apalis	<i>Apalis thoracica</i>	
Rudd's Apalis	<i>Apalis ruddi</i>	
Yellow-breasted Apalis	<i>Apalis flavida</i>	
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	
Red-faced Cisticola	<i>Cisticola erythrops</i>	
Rock-loving Cisticola	<i>Cisticola aberrans</i>	
Rattling Cisticola	<i>Cisticola chiniana</i>	
Grey-backed Cisticola	<i>Cisticola subruficapilla</i>	Rare/Accidental
Wailing Cisticola	<i>Cisticola lais</i>	
Winding Cisticola	<i>Cisticola galactotes</i>	
Levaillant's Cisticola	<i>Cisticola tinniens</i>	
Croaking Cisticola	<i>Cisticola natalensis</i>	
Piping Cisticola	<i>Cisticola fulvicapilla</i>	
Zitting Cisticola	<i>Cisticola juncidis</i>	
Desert Cisticola	<i>Cisticola aridulus</i>	
Cloud Cisticola	<i>Cisticola tatrix</i>	
Pale-crowned Cisticola	<i>Cisticola cinnamomeus</i>	
Wing-snapping Cisticola	<i>Cisticola ayresii</i>	
Tawny-flanked Prinia	<i>Prinia subflava</i>	
Black-chested Prinia	<i>Prinia flavicans</i>	Rare/Accidental
Karoo Prinia	<i>Prinia maculosa</i>	
Drakensberg Prinia	<i>Prinia hypoxantha</i>	
PASSERIFORMES: Locustellidae		
Fan-tailed Grassbird	<i>Schoenicola brevirostris</i>	
Little Rush Warbler	<i>Bradypterus baboecala</i>	
Barratt's Warbler	<i>Bradypterus barratti</i>	
PASSERIFORMES: Acrocephalidae		
Dark-capped Yellow Warbler	<i>Iduna natalensis</i>	
Olive-tree Warbler	<i>Hippolais olivetorum</i>	
Icterine Warbler	<i>Hippolais icterina</i>	
Sedge Warbler	<i>Acrocephalus schoenobenus</i>	
Marsh Warbler	<i>Acrocephalus palustris</i>	
Lesser Swamp Warbler	<i>Acrocephalus gracilirostris</i>	
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	
PASSERIFORMES: Hirundinidae		
Grey-rumped Swallow	<i>Pseudhirundo griseopyga</i>	



Black Saw-wing	<i>Psalidoprocne pristoptera</i>	
House Martin	<i>Delichon urbicum</i>	
South African Cliff Swallow	<i>Petrochelidon spilodera</i>	
Lesser Striped Swallow	<i>Cecropis abyssinica</i>	
Red-chested Swallow	<i>Cecropis semirufa</i>	
Mosque Swallow	<i>Cecropis senegalensis</i>	Rare/Accidental
Greater Striped Swallow	<i>Cecropis cucullata</i>	
White-throated Swallow	<i>Hirundo albigularis</i>	
Wire-tailed Swallow	<i>Hirundo smithii</i>	
Barn Swallow	<i>Hirundo rustica</i>	
Pearl-breasted Swallow	<i>Hirundo dimidiata</i>	
Rock Martin	<i>Ptyonoprogne fuligula</i>	
Banded Martin	<i>Neophedina cincta</i>	
Sand Martin	<i>Riparia riparia</i>	
PASSERIFORMES: Pycnonotidae		
Sombre Greenbul	<i>Andropadus importunus</i>	
Yellow-bellied Greenbul	<i>Chlorocichla flaviventris</i>	
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	
Yellow-streaked Greenbul	<i>Phyllastrephus flavostriatus</i>	
Dark-capped Bulbul	<i>Pycnonotus barbatus</i>	
PASSERIFORMES: Phylloscopidae		
Willow Warbler	<i>Phylloscopus trochilus</i>	
Yellow-throated Woodland Warbler	<i>Seicercus ruficapilla</i>	
PASSERIFORMES: Sylviidae		
Garden Warbler	<i>Sylvia borin</i>	
Bush Blackcap	<i>Lioptilus nigricapillus</i>	Near-threatened
Chestnut-vented Titbabbler	<i>Curruca subcoerulea</i>	
Common Whitethroat	<i>Curruca communis</i>	Rare/Accidental
PASSERIFORMES: Zosteropidae		
African Yellow White-eye	<i>Zosterops senegalensis</i>	
Orange River White-eye	<i>Zosterops pallidus</i>	
Cape White-eye	<i>Zosterops virens</i>	
PASSERIFORMES: Leiothrichidae		
Arrow-marked Babbler	<i>Turdoides jardineii</i>	



PASSERIFORMES: Buphagidae		
Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	
Yellow-billed Oxpecker	<i>Buphagus africanus</i>	
PASSERIFORMES: Sturnidae		
Wattled Starling	<i>Creatophora cinerea</i>	
Common Myna	<i>Acridotheres tristis</i>	Introduced species
Red-winged Starling	<i>Onychognathus morio</i>	
Burchell's Starling	<i>Lamprotornis australis</i>	
African Pied Starling	<i>Lamprotornis bicolor</i>	Endemic (country/region)
Cape Starling	<i>Lamprotornis nitens</i>	
Amethyst Starling	<i>Cinnyricinclus leucogaster</i>	
Black-bellied Starling	<i>Notopholia corusca</i>	
PASSERIFORMES: Muscicapidae		
Eastern Bearded Scrub Robin	<i>Cercotrichas quadrivirgata</i>	
Brown Scrub Robin	<i>Cercotrichas signata</i>	
White-browed Scrub Robin	<i>Cercotrichas leucophrys</i>	
Spotted Flycatcher	<i>Muscicapa striata</i>	
Ashy Flycatcher	<i>Muscicapa caerulescens</i>	
African Dusky Flycatcher	<i>Muscicapa adusta</i>	
Grey Tit Flycatcher	<i>Myioparus plumbeus</i>	
Pale Flycatcher	<i>Bradornis pallidus</i>	
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>	
Fiscal Flycatcher	<i>Sigelus silens</i>	
Cape Robin Chat	<i>Cossypha caffra</i>	
White-throated Robin Chat	<i>Cossypha humeralis</i>	
White-browed Robin Chat	<i>Cossypha heuglini</i>	
Chorister Robin Chat	<i>Cossypha dichroa</i>	
Red-capped Robin Chat	<i>Cossypha natalensis</i>	
White-starred Robin	<i>Pogonocichla stellata</i>	
Collared Flycatcher	<i>Ficedula albicollis</i>	Rare/Accidental
Cape Rock Thrush	<i>Monticola rupestris</i>	Endemic (country/region)
Sentinel Rock Thrush	<i>Monticola explorator</i>	
Whinchat	<i>Saxicola rubetra</i>	Rare/Accidental
African Stonechat	<i>Saxicola torquatus</i>	
Buff-streaked Chat	<i>Campicoloides bifasciatus</i>	
Southern Anteater Chat	<i>Myrmecocichla formicivora</i>	
Mountain Wheatear	<i>Myrmecocichla monticola</i>	
Capped Wheatear	<i>Oenanthe pileata</i>	Rare/Accidental



Pied Wheatear	<i>Oenanthe pleschanka</i>	Rare/Accidental
Familiar Chat	<i>Oenanthe familiaris</i>	
Mocking Cliff Chat	<i>Thamnolaea cinnamomeiventris</i>	
PASSERIFORMES: Turdidae		
Groundscraper Thrush	<i>Psophocichla litsitsirupa</i>	
Kurrichane Thrush	<i>Turdus libonyana</i>	
Olive Thrush	<i>Turdus olivaceus</i>	



Appendix C:

Avifauna Screening Assessment

Environmental Impact Assessment for Eskom's Northern KwaZulu-Natal Strengthening Project

ILI3864



DIGBY WELLS
ENVIRONMENTAL
