AUGUST 2019

NOZALA COAL (PTY) LTD: GRUISFONTEIN PROJECT

AVIFAUNAL IMPACT ASSESSMENT REPORT

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DOCUMENT GUIDE

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 (as amended in 2017) all specialist studies must comply with Appendix 6 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014). Table 1 shows the requirements as indicated above.

Table 1: Legal Requirements for All Specialist Studies Conducted

Legal Requirement		**Relevant Section in Specialist study**
(1)	A specialist report prepared in terms of these Regulations must contain-	
(a)	details of-	
	(i) the specialist who prepared the report; and	Professional Experience
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Professional Experience and Appendix 4
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Declaration of Independence
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 3.1
(cA)	an indication of the quality and age of base data used for the specialist report;	Section 3.3
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4 Section 5
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2 Section 3.4
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3.2
(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 Section 6
(g)	an identification of any areas to be avoided, including buffers;	Not Applicable as no sites were identified
(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;	Not Applicable as no sites were identified
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.4
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 7

Legal Requirement		Relevant Section in Specialist study
(k)	any mitigation measures for inclusion in the EMPr;	Section 6 Section 7
(l)	any conditions for inclusion in the environmental authorisation;	Section 7
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7
(n)	a reasoned opinion	Section 7
	whether the proposed activity, activities or portions thereof should be authorised;	Section 7
	regarding the acceptability of the proposed activity or activities; and	Section 7
	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;	Section 7
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not Applicable
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not Applicable
(q)	any other information requested by the competent authority.	Not Applicable

PROFESSIONAL EXPERIENCE

Ms. Megan Diamond Megan completed a Bachelor of Science degree in Environmental Management from the University of South Africa and has been involved in conservation for 20 years. She has 13 years' worth of experience in the field of bird interactions with electrical infrastructure and during this time has completed impact assessments for over 130 projects. During her tenure at the Endangered Wildlife Trust's Wildlife & Energy Programme and the Programme's primary project (i.e. the Eskom-EWT Strategic Partnership) from 2006 to 2013, Megan was responsible for assisting the energy industry and the national utility in minimising the negative impacts, associated with the construction and operation of electrical infrastructure, on wildlife through the provision of strategic guidance, risk and impact assessments, training and research. Megan (SACNASP Environmental Science Registration number 300022/14) currently owns and manages *Feathers Environmental Services* and is tasked with providing guidance to industry through the development of best practice procedures and avifaunal specialist studies for various developments including renewable energy facilities, power lines, power stations and substation infrastructure in addition to railway infrastructure and residential properties within South Africa and elsewhere within Africa. Megan has attended and presented at several conferences and facilitated workshops, as a subject expert, since 2007. Megan has authored and co-authored several academic papers, research reports and energy industry related guidelines, including the *BirdLife South Africa/ Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa* and the *Avian Wind Farm Sensitivity Map for South Africa* (2015), and played an instrumental role in facilitating the endorsement of these two products by the South African Wind Energy Association (SAWEA), IAIAsa (International Association for Impact Assessment South Africa) and Eskom. She chaired the Birds and Wind Energy Specialist Group in South Africa (2011/2012) and the IUCN/SSC Crane Specialist Group's Crane and Powerline Network (2013-2015), a working group comprised of subject matter experts from across the world, working in partnership to share lessons, develop capacity, pool resources, and accelerate collective learning towards finding innovative solutions to mitigate this impact on threatened crane populations. She is currently a member of the IUCN Stork, Ibis and Spoonbill Specialist Group and the Eskom-EWT Strategic Partnership Ludwig's Bustard Working Group.

DECLARATION OF INDEPENDENCE

I, **Megan Diamond**, in my capacity as a specialist consultant, hereby declare that I:

* Act as an independent specialist to Jacana Environmentals CC for this project.
* Do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Amendment to Environmental Impact Assessment Regulations, 2017.
* Will not be affected by the outcome of the environmental process, of which this report forms part of.
* Do not have any influence over the decisions made by the governing authorities.
* Do not object to or endorse the proposed developments, but aim to present facts and our best scientific and professional opinion with regard to the impacts of the development.
* Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Amendment to Environmental Impact Assessment Regulations, 2017.

INDEMNITY

* This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
* This report is based on a desktop investigation using the available information and data related to the site to be affected and a three-day winter site visit to the study area on 22-24 July 2019. No long-term investigation or monitoring has been conducted.
* The Precautionary Principle has been applied throughout this investigation.
* The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information at the time of study.
* Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
* The specialist investigator reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
* Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
* This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist investigator as specified above.
* Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

9 August 2019

EXECUTIVE SUMMARY

Nozala Coal (Pty) Limited (Nozala Coal) holds a coal prospecting right over the farm Gruisfontein 230 LQ in the Waterberg Coalfield, with the intent to establish an opencast coal mine and its associated ancillary infrastructure. The development envelope is located in Ward 3 of the Lephalale Local Municipality within the Waterberg District Municipality, Limpopo Province.

An assessment of the current SABAP2 data yielded a total of 222 bird species recorded across seven pentad grid cells, surrounding the proposed Gruisfontein Mine Project location, during the SABAP2 atlassing period to date. The presence of these species in the broader area provides an indication of the diversity and abundance of species that could potentially occur, particularly where suitable avifaunal habitat persists. Of the 222 species, 17 of these are considered to be of regional conservation concern i.e. regional Red List species. In addition, three species are near endemic to South Africa and a further 25 species are endemic to southern Africa. White Stork *Ciconia ciconia*, which is not listed, but is protected internationally under the *Bonn Convention on Migratory Species* was also recorded. Each of the Red List species have been recorded in low numbers. The low report rates can be attributed to the fact that the seven pentad grid cells have not been surveyed extensively and are unlikely to be an accurate reflection of the true densities within the pentads. Suitable natural habitat, to support these and other Red List species, exists throughout the study area, so it is likely that an increase in survey effort will undoubtedly yield a greater diversity and density of species. Although this report focuses on Red List species, since the impacts associated with the construction and operation of the proposed Gruisfontein Mine and its ancillary infrastructure are likely to be more biologically significant for these species, the impact on non-Red List species is also assessed, albeit in less detail. Furthermore, much of the mitigation recommended for Red List species will also protect non-Red List species in the study area. The non-Red List species that have been considered for this assessment include large eagles, buzzards, kestrels, kites, owls and various water-dependent bird species.

White-backed Vulture *Gyps africanus*, Lappet-faced Vulture *Torgos tracheliotos* and Cape Vulture *Gyps coprotheres* are well represented in the area. Vultures are a far-ranging species and are likely to forage extensively across the study area, as carcasses become available. There are four known Cape Vulture colonies and two roosts within a 100km radius of the proposed Gruisfontein Project site. The establishment of the mine at the proposed location will not directly affect the breeding activities at these colonies, but it is important to consider the fact that these birds are likely forage in the areas surrounding the Gruisfontein property. The vultures' ability to traverse vast distances and the high proportion of time they spend foraging outside protected areas and particularly in the vicinity of power lines makes them especially vulnerable to negative interactions (both collision and electrocution) with the expanding power line network across the region and in particular the power line infrastructure that forms part of this project.

Although breeding at some of the White-backed Vulture nest locations surveyed during the July 2019 site visit has ceased, large trees persist in the broader study area and are likely to continue to support the breeding activities of this species. In addition, 14 vulture restaurants have been established within a 50km radius of the project location, the closest of which is located 3km north of the northern boundary of the Gruisfontein property. Given the proximity of the historical and existing nest locations and the availability of food to the proposed mine development area, displacement impacts associated with habitat loss and disturbance are likely for White-backed Vultures and may

result in breeding failure if unmitigated. Similarly, collision and electrocution impacts associated with the power line infrastructure are potentially additional sources of direct mortality.

A single winter survey was conducted on 22-24 July 2019. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available at the proposed mine development site and within the larger study area by applying three survey techniques. All species observed and heard during the site visit were noted. The site visit produced a combined list of 49 species, covering both the project development area and to a limited extent, the surrounding area. With the exception of the three vulture species, no additional Red List species were observed during the site visit. Most observations were of small passerine species that are common to this area. Each of these species has the potential to be displaced by the proposed Gruisfontein Mine Project as a result of habitat transformation and disturbance. However, some species have persisted despite existing disturbance within the study area. This resilience, coupled with the fact that similar habitat is available throughout the broader area, means that the displacement impact will not be of regional or national significance.

The proposed development area is located within a single primary vegetation division namely the Savanna Biome and is comprised Limpopo Sweet Bushveld vegetation. Savanna is particularly rich in raptors, and forms the stronghold for the Red List species recorded in the broader project area by SABAP2 such as Bateleur *Terathopius ecaudatus*, Martial Eagle *Polemaetus bellicosus*, Tawny Eagle *Aquila rapax*, Lanner Falcon *Falco biarmicus*, African White-backed Vulture and Lappet-faced Vulture. Apart from Red List species, it also supports several non-Red List raptor species, such as Wahlberg's Eagle *Hieraaetus wahlbergi,* Brown Snake-Eagle *Circaetus cinereus*, the migratory Steppe Buzzard *Buteo vulpinus*, African Harrier Hawk *Polyboroides typus*, Jackal Buzzard *Buteo rufofuscus*, *and* African Hawk Eagle *Aquila spilogaster*. Apart from raptors, woodland in its undisturbed state is suitable for a wide range of other, non-raptorial Red List species, including Kori Bustard *Ardeotis kori*, Marabou Stork *Leptoptilos crumeniferus*, Abdim's Stork *Ciconia abdimii* and European Roller *Coracias garrulus.*

The habitat within which the proposed study area is located is relatively homogenous with little variation in sensitivity (rated to be moderate to high) from an avifaunal perspective. Areas that supported a density of non-Red List species (i.e. cattle feeding and drinking stations) are in fact degraded in habitat terms and unlikely to regularly support a diversity and/or abundance of Red List species. Although the site visit identified two nest locations on the Gruisfontein property, the presence of these do not necessarily increase the sensitivity of the project area given the species breeding at these locations. Therefore, there were no specific areas within the confines of the project boundary that were designated as highly sensitive no-go areas. The construction of the proposed Gruisfontein mine and its ancillary infrastructure will result in impacts of medium to high significance, which can be reduced to low to medium levels through the application of mitigation measures. It is anticipated that sustainable development of the proposed Gruisfontein Mine projects can be achieved with acceptable levels of impact on the resident avifauna subject to the following recommendations:

* A pre-construction inspection (walk-through) of the final mine layout, road and power line routes must be conducted to identify Red List species that may be breeding within footprint of the mine including the road and power line servitudes to ensure that the impacts to breeding species are adequately managed.

- The 22kV power line must be constructed using a bird friendly structure (i.e. Inverted Delta-T Structure).
- Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must also be considered.
- Insulating material to be maintained during the operational life span of the 22kV power line.
- Should electrocutions occur within the on-site substation yard, mitigation can be applied reactively using a range of insulation devices. Site-specific recommendations should be sought from a suitably qualified avifaunal specialist, in conjunction with the Endangered Wildlife Trust's Wildlife & Energy Programme.
- Every effort must be made to select a power line route that poses the least risk to birds, avoiding key avifaunal habitat and where possible routing the proposed power lines alongside other infrastructure in an effort to increase conductor visibility.
- High risk sections of power line must be identified by a qualified avifaunal specialist during the pre-construction inspection (walk-through) phase of the project, once the alignment has been finalized. If power line marking is required, bird flight diverters must be installed according to industry standard guidelines.
- Bird flight diverters to be maintained on sections of power line during the operational life span of the power line.
- Construction activity should be restricted to the immediate footprint of the infrastructure. **The recommendations of the ecological study must be strictly implemented.**
- Access to the remainder of the site must be strictly controlled to prevent unnecessary disturbance of Red List species.
- Maximum use should be made of existing roads and the construction of new roads must be kept to a minimum. New roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats.
- Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions.
- Awareness initiatives to educate road users about the presence of avifaunal species utilising the roads, particularly during dusk and dawn periods.
- Should bird collisions with motor vehicles persist site-specific recommendations to be sought from a suitably qualified avifaunal specialist in conjunction with the Endangered Wildlife Trust's Wildlife & Transport Programme.
- Bi-annual post construction monitoring to be conducted, using a variety of comparable survey techniques, to assess actual impacts, determine diversity trends & assess mitigation efficacy, particularly with regards to vultures.
- In addition to this, the normal suite of environmental good practices should be applied, such as ensuring strict control of staff, vehicles and machinery on site and limiting the creation of new roads as far as possible.

TABLE OF CONTENTS

1. INTRODUCTION

Nozala Coal (Pty) Limited (Nozala Coal) holds a coal prospecting right over the farm Gruisfontein 230 LQ in the Waterberg Coalfield, with the intent to establish an opencast coal mine and its associated ancillary infrastructure. The coal will be used to supply the local thermal market i.e. to support the Grootgeluk mine in supplying the nearby Matimba and Medupi Power Stations, approximately 28 km south-east of the proposed Gruisfontein Project. Opportunities also exist to supply thermal coal into the Witbank region or to export as a low-grade coal product to international markets. Gruisfontein 230 LQ is a privately-owned farm used for cattle and game ranching and is approximately 1136ha in extent, with the development envelope comprised of approximately 830ha (70%) of the identified land portion. The infrastructure will be placed to the south of the open pit and include a processing plant, temporary discard dump, long-term discard dump, overburden and topsoil stockpiles and water management and other supporting infrastructure. The coal will be transported via road to the Medupi and/or Matimba Power Stations, with an option of an export product to be transported via rail to the market. The Gruisfontein Project is located in Ward 3 of the Lephalale Local Municipality within the Waterberg District Municipality, Limpopo Province (FIGURE 1) with Lephalale, the main centre in the area, 40km to the south-east and the smaller town of Steenbokpan approximately 20km to the south.

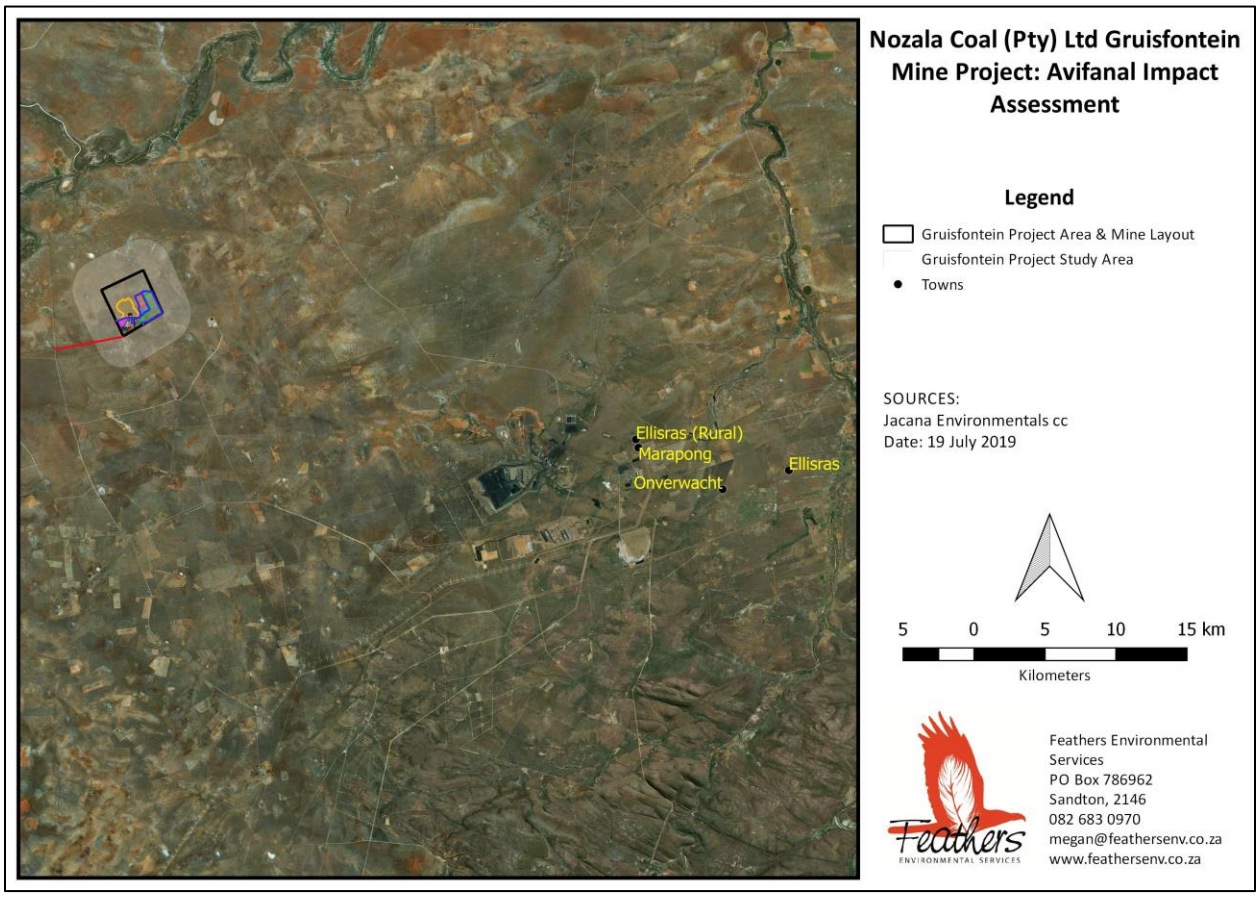

FIGURE 1: Regional map detailing the location of the proposed Gruisfontein Project and proposed mine layout in in Ward 3 of the Lephalale Local Municipality within the Waterberg District Municipality, Limpopo Province.

The National Environmental Management Act (NEMA) (Act 107 of 1998) requires that an impact assessment be conducted for any development which could have a significant effect on the environment, with the objective to identify, predict and evaluate the actual and potential impacts of these activities on ecological systems; identify alternatives; and provide recommendations for mitigation to minimize the negative impacts. In order to meet the Environmental Impact Assessment (EIA) requirements as outlined in the 2014 National Environmental Management Act (No 107 of 1998) as amended in 2017, Nozala Coal require detailed specialist studies that will document any potential fatal flaws, the impacts of the project and recommend measures to manage (maximise positive and minimise negative) and monitor those impacts. Nozala Coal appointed RSV Enco Consulting (Pty) Ltd to project manage the processes to obtain the required applications and authorisations for the proposed development. RSV Enco in turn appointed Jacana Environmentals cc (Jacana) as independent environmental assessment practitioners to manage the Environmental Impact Assessment (EIA) process for the proposed development. Feathers Environmental Services was subsequently appointed to conduct an avifaunal impact assessment to address comments received from Interested and Affected Party, Ms. Kerri Wolter of VulPro NPC. This avifaunal impact assessment is based on a desktop review and the findings of a three-day site visit to the study area, conducted on 22-24 July 2019. The assessment uses a set methodology and various data sets (discussed elsewhere) to determine which avian species regularly occur within the study area, the availability of bird micro habitats (i.e. avifaunal sensitive areas), the possible impacts of the proposed development and their significance and the provision of recommendations for the mitigation of the anticipated impacts. The avifaunal impact assessment and this resultant report is complementary to the *Faunal and Floral Ecological Assessment as part of the Environmental Impact Assessment process for the proposed Gruisfontein Mining Project, Limpopo Province*, compiled by Scientific Terrestrial Services, June 2019.

2. RELEVANT LEGISLATION AND GUIDELINES

The following pieces of legislation are applicable to this assessment:

2.1 The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is an international convention (to which South Africa is a signatory) and represents a commitment to sustainable development. The Convention has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (http://www.cbd.int/convention/guide/). The convention makes provision (in a general policy guideline) for keeping and restoring biodiversity. In addition to this the CBD is an ardent supporter of thorough assessment procedures (Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs)) and requires that Parties apply these processes when planning activities that will have a biodiversity impact. An important principle encompassed by the CBD is the precautionary principle which essentially states that where serious threats to the environment exist, lack of full scientific certainty should not be used as a reason for delaying management of these risks. The burden of proof that the impact will *not* occur lies with the proponent of the activity posing the threat. In addition, the Aichi Biodiversity Targets (CBD 2011) address several priority issues i.e. the loss of biodiversity and its causes; reducing direct pressure on biodiversity; safeguarding ecosystems, species and genetic diversity and participatory planning to enhance implementation of biodiversity conservation. Each of these is

relevant in the case of energy infrastructure and bird conservation through all project phases from planning to the implementation of mitigation measures for existing developments.

2.2 The Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) is an intergovernmental treaty and is the most appropriate instrument to deal with the conservation of terrestrial, aquatic and avian migratory species. The convention includes policy and guidelines with regards to the impacts associated with man-made infrastructure. CMS requires that Parties (South Africa is a signatory) take measures to avoid migratory species from becoming endangered (Art II, par. 1 and 2) and to make every effort to prevent the adverse effects of activities and obstacles that seriously impede or prevent the migration of migratory species (Art III, par. 4b and 4c). At CMS/CoP7 (2002) Res. 7.2 on Impact Assessment and Migratory Species was accepted, requesting Parties to apply appropriate SEA and EIA procedures for all proposed developments. An agreement developed in the framework of CMS, in force since November 1999, brings the 119 Range States of the Africa Eurasian Waterbird Agreement (AEWA) region together in a common policy to protect migratory waterbirds that use the flyway from the Arctic to southern Africa. The agreement contains a number of obligations that are relevant to migratory waterbirds and energy infrastructure. AEWA has also published a series of practical guidelines that enable Parties to effectively address conservation issues influencing the status of migratory waterbirds. The most relevant guideline for migratory birds and energy infrastructure is the *Guideline on how to avoid, minimise or mitigate impact of infrastructural developments and related disturbance affecting waterbirds* (Tucker & Treweek, 2008).

2.3 The Agreement on the Conservation of African-Eurasian Migratory Water Birds

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds and even the South African penguin. The core activities carried out under AEWA are described in its Action Plan, which is legally binding for all countries that have joined the Agreement. The AEWA Action Plan details the various measures to be undertaken by Contracting Parties (South Africa included) to guarantee the conservation of migratory waterbirds within their national boundaries. These include species and habitat protection, and the management of human activities, as well as legal and emergency measures.

2.4 The National Environmental Management Act 107 of 1998 (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) creates the legislative framework for environmental protection in South Africa and is aimed at giving effect to the environmental right in the Constitution. It sets out a number of guiding principles that apply to the actions of all organs of state that may significantly affect the environment. Sustainable development (socially, environmentally and economically) is one of the key principles, and internationally accepted principles of environmental management, such as the precautionary principle and the

polluter pays principle, are also incorporated. NEMA also provides that a wide variety of listed developmental activities, which may significantly affect the environment, may be performed only after an environmental impact assessment has been done and authorization has been obtained from the relevant authority. Many of these listed activities can potentially have negative impacts on bird populations in a variety of ways. The clearance of natural vegetation, for instance, can lead to a loss of habitat and may depress prey populations, while erecting structures needed for generating and distributing energy, communication, and so forth can cause mortalities by collision or electrocution.

2.5 The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations)

The National Environmental Management: Biodiversity Act (No. 10 of 2004), (NEMBA) regulations on Threatened and Protected Species (TOPS) provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. The national Act provides for among other things, the management and conservation of South Africa's biodiversity; protection of species and ecosystems that necessitate national protection and the sustainable use of indigenous biological resources.

2.6 The Limpopo Environmental Management Act, 2003 (Act 7 of 2003) (LEMA)

The Limpopo Province is rich in natural biodiversity, with most of the flora and fauna species protected in private nature reserves and provincial parks within the province. The Limpopo Government promulgated the Limpopo Environmental Management Act (No. 7 of 2003) (LEMA) to regulate the utilisation of wildlife as well as the protection and conservation of the environment as a whole. It makes provision for a wide variety of matters regarding the environment including: protected areas; hunting of wild and exotic animals; the establishment of Wildlife Councils; inland fishing and the protection and aquatic systems; the protection of indigenous plants; the application of CITES; environmental pollution; and restrictions on development and environmental impact reports. The objectives of this Act are to 1) manage and protect the environment in the Province; 2) secure ecologically sustainable development and responsible use of natural resources in the Province; 3) contribute to the progressive realisation of the fundamental rights contained in section 24 of the Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996), and 4) give effect to international agreements effecting environmental management which are binding on the Province. This Act must be interpreted and applied in accordance with the national environmental management principles set out in Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

2.7 Limpopo Conservation Plan, Version 2 (LCPv2)

Bioregional plans are one of a range of decision support tools provided for in the Biodiversity Act 1 that can be used to enable biodiversity conservation in priority areas. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity (Desmet et al, 2013). The Limpopo Conservation Plan version 2 (LCPv2) supports integrated development planning and sustainable development by identifying an efficient set of Critical Biodiversity Areas (CBA) that are required to meet national and provincial biodiversity objectives and need to be

maintained in the appropriate condition for their category. The LCPv2 contains a map of CBAs together with accompanying land-use guideline tables, aimed at informing strategic decision making and facilitating biodiversity conservation in priority areas outside the protected area network (Desmet et al, 2013).

3. STUDY METHODOLOGY

3.1 Terms of Reference

The avifaunal specialist has conducted this avifaunal impact assessment according to the following terms of reference:

- Assess various avifaunal datasets, including but not limited to Important Bird Areas (IBAs) and describe the avifaunal communities (particularly with reference to Red List species) most likely to impacted on by the proposed Gruisfontein Mine and its ancillary infrastructure;
- Identify and assess suitable avifaunal habitats that occur within the proposed study area and the avifaunal species associated with the identified habitats;
- Identify and describe the potential impacts (both positive and negative) associated with the construction and operation of the Gruisfontein Mine and its ancillary infrastructure and assess the significance of each in terms of the impact on the environment and the avifaunal communities that the study area supports;
- Provide mitigation measures (to be included in the EMPr) for enhancing benefits and avoiding or mitigating negative impacts and risks in addition to recommendations for any ongoing monitoring that may be required;
- Provide a reasoned opinion as to whether the proposed Gruisfontein Mine and its ancillary infrastructure should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation; and
- Identify any assumptions and limitations that have informed the assessment or gaps in knowledge that have become apparent.

3.2 Methods

The following methodology was employed to compile this avifaunal impact assessment report:

- Various avifaunal data sets (listed below) were collected and examined to at a desktop level to determine the location and abundance of sensitive Red List (as well as non-Red List) species that may be vulnerable to the impacts associated with the construction and operation of the proposed Gruisfontein Mine and its ancillary infrastructure;
- Suitable avifaunal habitats and potential sensitive areas within the immediate surrounds of the proposed developments, where impacts are likely to occur, were identified using various Geographic Information System (GIS) layers and Google Earth imagery and confirmed based on personal observations made during the site visit on 22-24 July 2019 (FIGURE 2: Track Log);

* Primary bird data was collected by means of three survey methods during the site visit. These methods included point-count surveys at focal sites, three vehicle transects and incidental observations (section 4.1). These survey methods were employed to determine the bird community structure both at the project site and its surrounds.
* The potential impacts, associated with the construction and operation of the proposed Gruisfontein Mine and its ancillary infrastructure on the avifaunal community, and the significance were predicted and assessed according to quantitative criteria (APPENDIX 3); and
* Practical recommendations for the management and mitigation of potentially significant impacts, related to the construction and operation of the proposed Gruisfontein Mine and its ancillary infrastructure, are provided in section 6 for inclusion in the draft EMPr.

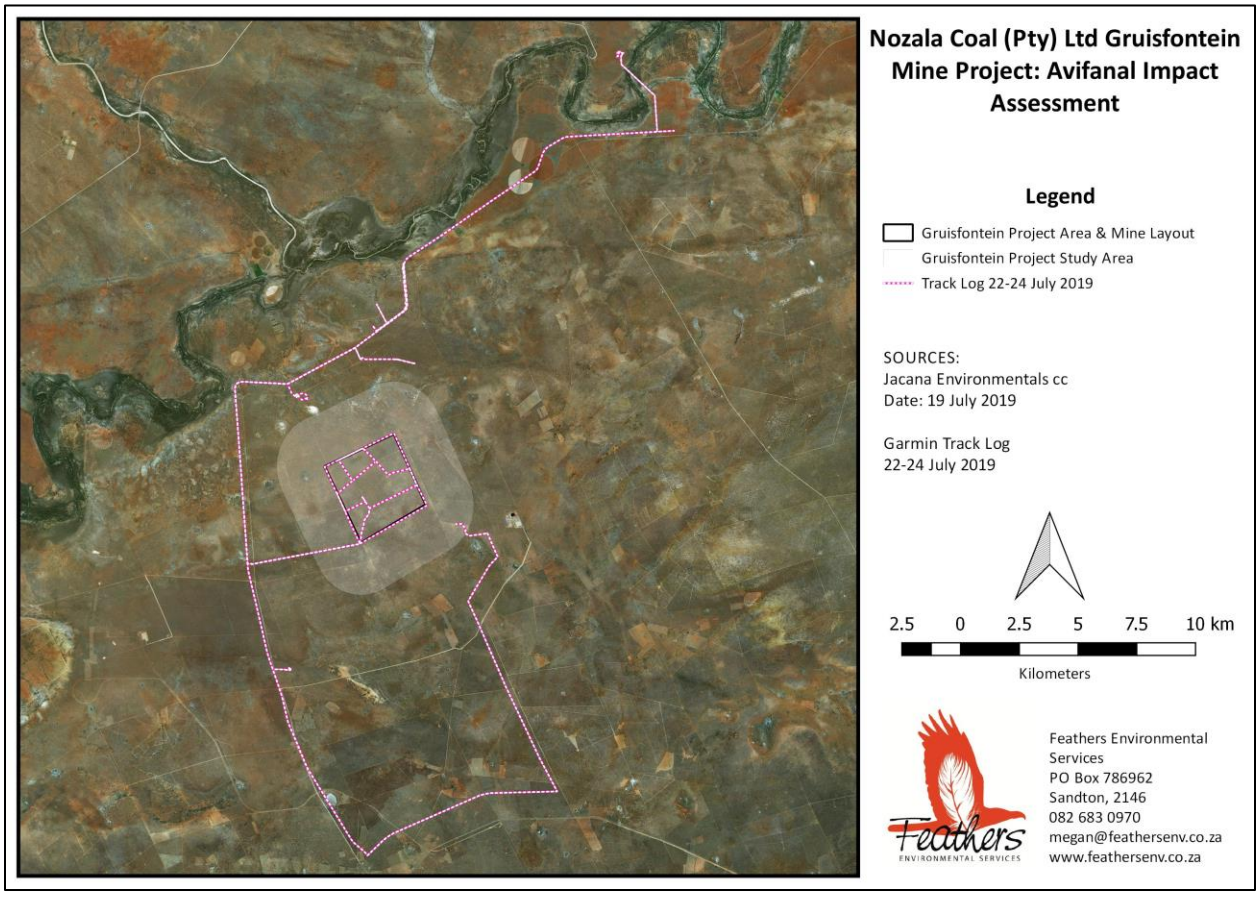

FIGURE 2: Track log detailing the areas assessed during the site visit to the study area and its broader surrounds on 22-24 July 2019.

3.3 Data Sources

The following data sources and reports were used in varying levels of detail for this study:

- Bird distribution data of the South African Bird Atlas 2 (SABAP 2) was obtained from the Animal Demography Unit of the University of Cape Town (1 August 2019) as a means to ascertain which species occur within the **broader area**, based on nine pentad grid cells surrounding the proposed Gruisfontein Mine and its ancillary infrastructure. Each pentad is approximately 8 × 7.6 km. Between 2007 and 2019, a total of 20 full protocol cards (i.e. 20 bird surveys lasting a minimum of two hours each) have been completed across the seven of the nine pentads. The relevant pentads within the study area include: 2325_2715; 2325_2720; 2330_2710; 2330_2715; 2335_2710; 2335_2715 and 2335_2720 (FIGURE 3);
- The Important Bird Areas (IBAs) report (Marnewick et al. 2015) was consulted to determine the location of the nearest IBAs and their importance for this study. The Waterberg System (SA007) IBA has relevance to this assessment;
- The Co-ordinated Waterbird Count (CWAC – Taylor et al. 1999) data was consulted determine if large concentrations of water birds, associated with South African wetlands, may occur within the study area. There are no CWAC sites located within the project area;
- The Coordinated Avifaunal Roadcount project (CAR – Young et al, 2003) data was consulted to obtain relevant data on large terrestrial bird report rates in the area. There are no CAR routes located within the project area;
- The conservation status and endemism information of all bird species occurring in the aforementioned pentads was then determined with the use of the Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al. 2015) and the IUCN Red List of Threatened Species (http://www.iucnredlist.org/) and the most recent and comprehensive summary of southern African bird biology (Hockey et al. 2005);
- The latest vegetation classification described in the Vegetation Map of South Africa (South African National Biodiversity Institute, 2012 and Mucina & Rutherford, 2006) was consulted in order to determine which vegetation types occur within the proposed study area;
- High-resolution Google Earth ©2018 imagery was used to examine the microhabitats within the proposed study area;
- KMZ/KML shapefiles detailing the location of the proposed coal mine development was obtained from Jacana (19 July 2019);
- A field visit to the project area was conducted on 22-24 July 2019 (winter survey) to form a first-hand impression of avifaunal species presence and micro-habitat occurring within the proposed development site the larger project area (FIGURE 2). This information, together with the SABAP2 data was used to compile a comprehensive list of species that could occur in the study area;
- Personal observations made during the aforementioned site visit to the study coupled with the author's experience gained from assessing various infrastructure development projects in the Limpopo region have been used to formulate a professional opinion of the species likely to occur in the project area and the likely impacts that the proposed development may have on the resident avifaunal community;

* The power line - bird mortality incident database of the Eskom/Endangered Wildlife Trust Strategic Partnership (1996 to 2013) was consulted to determine which of the species occurring in the study area are typically impacted upon by power lines, and the extent of the impact;
* Vulture movement data for the area, received from VulPro (2 August, 2019);
* White-backed Vulture nest locations and vulture restaurants, received from Joseph Heymans, Biodiversity Officer, Limpopo Economic Development Environment and Tourism Department. This dataset is reported to be approximately ten years old (pers comms Joseph Heymans);
* Faunal and Floral Ecological Assessment as part of the Environmental Impact Assessment process for the proposed Gruisfontein Mining Project, Limpopo Province: Part A Background Information, compiled by Scientific Terrestrial Services, June 2019;
* Faunal and Floral Ecological Assessment as part of the Environmental Impact Assessment process for the proposed Gruisfontein Mining Project, Limpopo Province: Part C Faunal Assessment, compiled by Scientific Terrestrial Services, June 2019;
* Proposed Gruisfontein Project: Final Scoping Report compiled by Jacana Environmentals cc, June 2019; and
* Nozala Coal (Pty) Ltd Gruisfontein Project (DEA Reference Number: LP30/5/1/2/2/10170MR) - Draft Scoping Report Review and Comments, compiled by VulPro, May 2019.

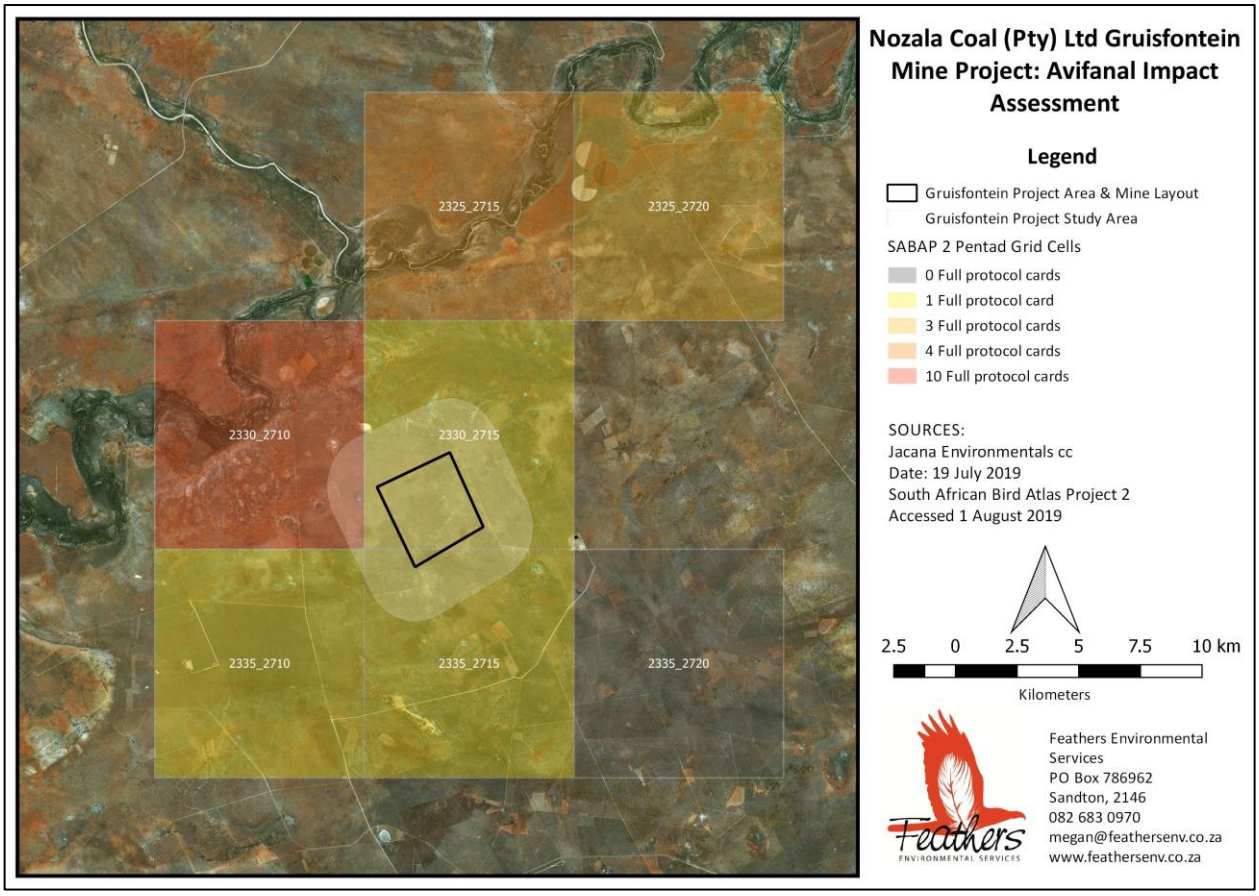

FIGURE 3: Location of the seven South African Bird Atlas Project 2 (SABAP2) pentad grid cells that were considered for the proposed mine development.

3.4 Limitations & Assumptions

The author assumed that the sources of information used are reliable. However, it must be noted that there are limiting factors and these may potentially detract from the accuracy of the predicted results.

- The report is the result of a short-term study and is based on a three-day site visit to the proposed development area. No long-term, seasonal monitoring was conducted by the avifaunal specialist**.** This assessment relies upon secondary data sources with regards to bird occurrence and abundance such as the SABAP2 and IBA projects. These comprehensive datasets provide a valuable baseline against which any changes in species presence, abundance, and distribution can be monitored. However, primary information on bird habitat and avifaunal species occurrence collected during the site visit and together with professional judgement, based on extensive field experience since 2006, was used directly in determining which species of conservation importance are likely to occur within suitable avifaunal habitat types within the proposed development area. Based on these findings, the specialist was able to identify and assess the anticipated impacts and provide recommendations for mitigation.
- The site visit to the study area and the resultant observations were made in a single season (i.e. winter), during which time various species may not have been present in the study area and therefore may not be a true indication of all bird species potentially present in the area.
- By virtue of their mobility, the assessment of bird presence and abundance cannot be confined to the proposed Gruisfontein project site, therefore the **study area was defined as a 2km zone** around the proposed development area. Avifaunal sensitivity has been defined for this study area i.e. the proposed Gruisfontein project site in addition to the 2km zone surrounding the proposed development.
- Although the proposed Gruisfontein mine and its ancillary infrastructure are located largely within a single pentad grid cell (2330_2715), a larger area is necessary to obtain a dataset that is large enough (encompassing nine pentad grid cells) to ensure that reasonable conclusions about species diversity and densities, in a particular habitat type, can be drawn. Coverage by SABAP2 has not been as extensive with a total of 20 full protocol data cards being completed across seven of the nine pentads (FIGURE 3). These surveys should provide a reasonably accurate snapshot of the avifauna in the study area, but are unlikely to be an accurate reflection of the true densities within the pentads.
- The focus of this assessment is primarily on the potential impacts on regional Red List and priority species i.e. species that are vulnerable to the displacement and collision impacts associated with the construction and operation of the proposed Gruisfontein mine and its ancillary infrastructure. The impact on non-Red List species is also assessed, albeit in less detail. Furthermore, much of the mitigation recommended for Red List species will also protect non-Red List species in the study area.
- The routing and proposed structure configuration for the grid connection (i.e. 22kV power line) was not available for assessment. This is a potentially serious limitation since the power line could potentially pose a collision and electrocution risk to birds.
- Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the avifaunal specialist field since 2006. However, bird behaviour can't be reduced to formulas that will hold true under all circumstances. It must also be noted that, it is often not possible to entirely eliminate the risk of the disturbance and displacement impacts

associated with the construction and operational activities. Our best possible efforts can probably not ensure zero impact on birds. Assessments such as this attempt to minimise the risk as far as possible, and although the impacts associated with the proposed developments will be unavoidable, they are likely to be temporary and of medium to low significance.

The above limitations need to be stated as part of this assessment so that the reader fully understands the complexities. **However**, **they do not detract from the confidence that this author has in the findings of this impact assessment report and subsequent recommendations for this project**.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 Relevant Bird Populations

4.1.1. South African Bird Atlas Project 2 Data (SABAP2)

A total of 222 bird species have been recorded within the nine-pentad broader study area during the SABAP2 atlassing period to date (APPENDIX 2). The presence of these species in the broader study area provides an indication of the diversity of species that could potentially occur within the areas earmarked for the proposed developments, particularly where pockets of natural vegetation/habitats persist. Of the 222 species, 17 of these are considered to be of regional conservation concern i.e. regional Red List species (Taylor et al, 2015). In addition, Cape White-eye *Zosterops virens* is near endemic to South Africa (species whose range extends only marginally outside South Africa), three species are endemic to southern Africa (species that are native and restricted to southern Africa) and a further 25 are near endemic to southern Africa. The White Stork *Ciconia ciconia*, which is not listed, but is protected internationally under the *Bonn Convention on Migratory Species* was also recorded. The priority species that are potentially vulnerable to the impacts associated with the Gruisfontein Mine Project are presented in TABLE 4-1.

Each of the Red List species have been recorded in low numbers, with less than 15 individuals being recorded over the ten-year survey period within the relevant pentads. The low report rates can possibly be attributed to the fact that the pentad grid cells have not been surveyed extensively and are unlikely to be an accurate reflection of the true densities within the pentads. Suitable natural habitat, to support these and other Red List species, exists throughout the study area, so it is likely that an increase in survey effort will undoubtedly yield a greater diversity and density of species. It is important to note that White-backed Vulture *Gyps africanus* (n=1) and Lappet-faced Vulture *Torgos tracheliotos* (n=3) are the only Red List species recorded in the pentad within which the proposed Gruisfontein Mine Project is located (2330_2715) to date. Although this report focuses on Red List species, since the impacts associated with the construction and operation of the proposed Gruisfontein Mine and its ancillary infrastructure are likely to be more biologically significant for these species, the impact on non-Red List species is also assessed, albeit in less detail. Furthermore, much of the mitigation recommended for Red List species will also protect non-Red List species in the study area. The non-Red List species that have been considered for this assessment include large eagles, buzzards, kestrels, kites, owls and various water-dependent bird species. Each Red List species' potential for occurring in a specific habitat class is indicated in TABLE 4.1, in addition to the type of impact that could potentially affect each species, specific to the location of this development.

TABLE 4-1 Annotated list of regional Red List species that have been recorded in the relevant pentads surrounding the proposed Gruisfontein mine and its ancillary infrastructure development.

COMMON NAME	REGIONAL CONS. STATUS	GLOBAL CONS. STATUS	AV. REPORT RATE (No. of Records)	SAVANNA	PANS	DISPLACEMENT (HABITAT LOSS DISTURBANCE)	POWERLINE COLLISION	POWERLINE ELECTROCUTION	ROAD COLLISION
Bateleur *Terathopius ecaudatus*	EN		20.00 (4)	x	-	x	x	x	-
Bustard, Kori *Ardeotis kori*	NT		10.00 (2)	x	-	x	x	-	-
Duck, Maccoa *Oxyura maccoa*	NT		5.00 (1)	-	-	-	-	-	-
Eagle, Martial *Polemaetus bellicosus*	EN		5.00 (1)	x	-	x	x	x	-
Eagle, Tawny *Aquila rapax*	EN		40.00 (8)	x	-	x	x	x	x
Falcon, Lanner *Falco biarmicus*	VU		25.00 (5)	x	-	x	x	x	x
Flamingo, Greater *Phoenicopterus ruber*	NT		5.00 (1)	-	x	-	x	-	-
Painted-snipe, Greater *Rostratula benghalensis*	NT		30.00 (6)	-	x	-	-	-	-
Pratincole, Black-winged *Glareola nordmanni*	NT		10.00 (2)	-	x	-	-	-	-
Roller, European *Coracias garrulus*	NT		15.00 (3)	x	-	-	-	-	x
Secretarybird *Sagittarius serpentarius*	VU		Incidental (1)	x	-	x	x	-	-
Stork, Abdim's *Ciconia abdimii*	NT		5.00 (1)	x	x	-	x	-	-
Stork, Marabou *Leptoptilos crumeniferus*	NT		30.00 (6)	x	-	x	x	-	-
Stork, Saddle-billed *Mycteria ibis*	EN		10.00 (2)	-	x	-	x	-	-
Stork, Yellow-billed *Mycteria ibis*	EN		25.00 (5)	-	x	-	x	-	-
Vulture, Lappet-faced *Torgos tracheliotus*	EN		15.00 (3)	x	-	x	x	x	-
Vulture, White-backed *Gyps africanus*	CR		60.00 (12)	x	-	x	x	x	-
Stork, White *Ciconia ciconia*	BONN		5.00 (1)	-	x	-	x	-	-

4.1.2. Important Bird Areas (IBA's)

Some sites are exceptionally important for maintaining the taxa dependent upon the habitats and ecosystems in which they occur. Vigorous protection of the most critical sites is one important approach to conservation. Many species may be effectively conserved by this means. Patterns of bird distribution are such that, in most cases, it is possible to select sites that support many species. These sites, carefully identified on the basis of the bird numbers and species complements they hold, are termed Important Bird Areas (IBAs). IBAs are selected such that, taken together, they form a network throughout the species' biogeographic distributions. IBAs are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network. They are responsible for one (or more) of three factors:

- Hold significant numbers of one or more globally threatened species;
- Are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species;
- Have exceptionally large numbers of migratory or congregatory species.

There are no IBAs within the immediate study area (FIGURE 4). The closest IBA to the proposed study area is the Waterberg System (SA007), with its northern boundary located approximately 40km to the south-east of the proposed Gruisfontein Project site. The diversity of habitats within the reserve supports a fairly significant diversity of bird species. Kransberg, a massif within the western sector of the Waterberg range, holds a large colony of 800–850 Cape Vulture *Gyps coprotheres* pairs (818 active nests in 2013). There are many other raptor species in the IBA, such as Martial Eagle *Polemaetus bellicosus*, Tawny Eagle *Aquila rapax*, Verreauxs' Eagle *Aquila verreauxii*, Jackal Buzzard *Buteo rufofuscus*, African Harrier-Hawk *Polyboroides typus* African Grass Owl *Tyto capensis*. The IBA also contains breeding populations of Peregrine Falcon *Falco peregrinus*, Lanner Falcon *Falco biarmicus*, Black Stork *Ciconia nigra* and Cape Eagle-Owl *Bubo capensis*. The grasslands support small populations of Denham's Bustard *Neotis denhami*, White-bellied Korhaan *Eupodotis senegalensis*, Blue Crane *Anthropoides paradiseus* and Secretarybird *Sagittarius serpentarius*. Woodland birds include Southern Ground-Hornbill *Bucorvus leadbeateri*, Red-crested Korhaan *Lophotis ruficrista*, Monotonous Lark *Mirafra passerina*, Barred Wren-Warbler *Calamonastes fasciolatus*, Southern White-crowned Shrike *Eurocephalus anguitimens*, Scaly-feathered Finch *Sporopipes squamifrons*, Violet-eared Waxbill *Uraeginthus granatinus* and Black-faced Waxbill *Estrilda erythronotos*. Half-collared Kingfisher *Alcedo semitorquata* and Mountain Wagtail *Motacilla clara* occur along the mountain streams. Some of the rivers hold White-backed Night Heron *Gorsachius leuconotus* and African Finfoot *Podica senegalensis*. Biome-restricted species include Buff-streaked Chat *Campicoloides bifasciata*, Cape Rock Thrush *Monticola rupestris*, Kurrichane Thrush *Turdus libonyanus*, White-bellied Sunbird *Cinnyris talatala*, and Burchell's Starling *Lamprotornis australis*, are common in the IBA (Marnewick et al. 2015).

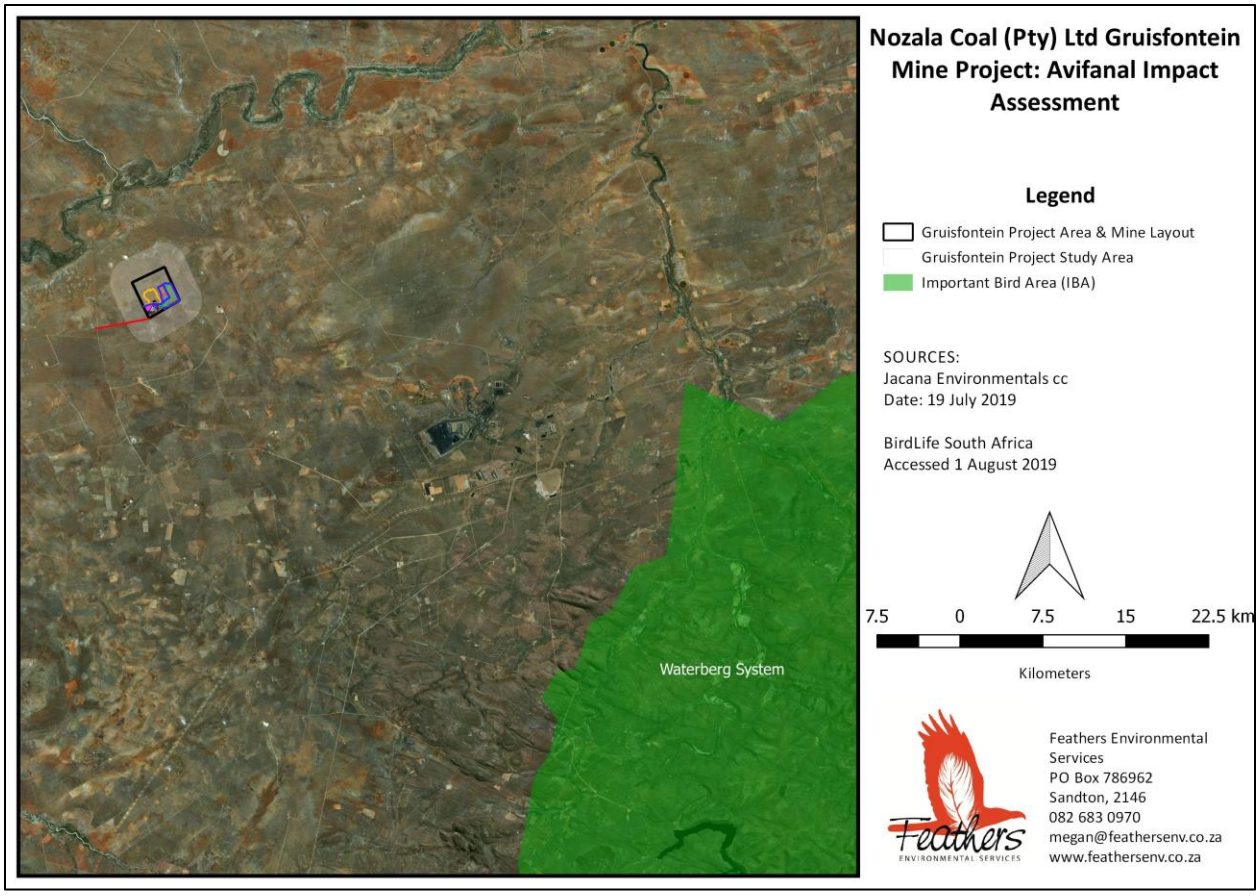

FIGURE 4: Regional map detailing the location of the proposed Gruisfontein Mine and its associated infrastructure in relation to the Waterberg System Important Bird Area (IBA).

Cape Vulture, a trigger species within this IBA, are capable of traversing large distances. Cape Vulture individuals captured in the Eastern Cape, covered an area of approximately 366 km^2 (Pfeiffer et al. 2015) while those captured in the North West Province and Namibia foraged over much larger areas, approximately 90 845 km^2 and 21 320 km^2 respectively (Bamford et al. 2007, Phipps et al. 2013b). However, as a communal cliff-nesting raptor, Cape Vultures form large breeding colonies on suitable rock formations (Benson 2015) and also congregate at overnight roosts (cliffs, on power line poles/towers, or in trees) to sleep (Mundy et al. 1992, Dermody et al. 2011, Pfeiffer et al. 2015). As adult breeding Cape Vulture usually forage within a certain area around a central colony (Boshoff & Minnie 2011), the risk of impact is likely to be greatest closest to these sites. Cape Vultures can be expected to regularly use the air-space within 50km around their roosts and breeding colonies, based on fixed kernel density estimates (Venter et al, 2018). Vultures will occur well beyond these zones, but there is a lower probability of them occurring regularly beyond these core foraging ranges. Although Kransberg is located almost 100km from the proposed Gruisfontein Project site, the presence of Cape Vultures in the study area cannot be discounted given their foraging range. This premise was confirmed with observations of Cape Vulture during the site visit to the study area in July 2019.

4.1.3. Vulture Colonies, Nest Locations, Movement & Restaurant Data

Despite being a remarkable part of South Africa's rich and celebrated diversity, vultures are one of a handful of species that are largely ignored and have been saddled with the rather poor reputation of being creatures of the afterlife (Wolter et al, 2013). Their contribution to the environment is enormous - they reduce the spread of diseases such as anthrax and keep rabies in check by minimising contact of the virus with mammalian predators (Sharp, 2001; Mudur, 2001; Hugh-Jones and de Vos, 2002) as well as reduce blow-fly populations. Six of South Africa's vultures are threatened, so their conservation through a variety of mechanisms is an absolute must. The broader study area has undergone fairly significant land use changes in recent years, with the establishment of mines and coal fired power stations resulting in a loss of habitat, and a reduction in ungulate populations, key threats to this family of birds. However, substantial expanses of intact woodland persist with the broader study area and support populations of livestock and game. The availability of both habitat and food means that at least three vulture species (i.e. White-backed Vulture, Lappet-faced Vulture and Cape Vulture) are well represented in the area.

As mentioned above, vultures are a far-ranging species and are likely to forage extensively across the study area, as carcasses become available (Wolter et al 2010). There are four known Cape Vulture colonies and two roosts within a 100km radius of the proposed Gruisfontein Project site (FIGURE 5). The establishment of the mine at the proposed location will not directly affect the breeding activities at these colonies, but it is important to consider the fact that these birds are likely forage in the areas surrounding the Gruisfontein property. Research suggests that Cape Vulture movement patterns and core foraging ranges are closely associated with the spatial distribution of transmission power lines (Phipps *et al.* 2013). The vultures' ability to traverse vast distances and the high proportion of time they spend foraging outside protected areas and particularly in the vicinity of power lines makes them especially vulnerable to negative interactions (both collision and electrocution) with the expanding power line network across the region and in particular the power line infrastructure that forms part of this project. Continued, unmitigated mortality of adult breeding birds on the power line infrastructure will undoubtedly affect breeding success at these colonies.

White-backed Vultures are prevalent in the study area, with SABAP2 report rates of 60% and the presence of at least 110 nest locations recorded in a 70km radius surrounding the Gruisfontein Project site (FIGURE 5). Although breeding at some of the nest locations surveyed during the July 2019 site visit has ceased, large trees persist in the broader study area and are likely to continue to support the breeding activities of this species. In addition, 14 vulture restaurants have been established within a 50km radius of the project location - the closest of which is located just 3km north of the northern boundary of the Gruisfontein 230LQ property (FIGURE 5). To promote the survival of these high-flying scavengers, the practice of supplemental feeding of vultures in so called vulture restaurants, was initiated and today there are 236 documented vulture restaurants scattered throughout South Africa (Wolter et al, 2013). In this system of supplementary feeding, carcasses donated by stock farmers and hunters in the surrounding area are routinely placed out at selected sites, assisting in the continued survival of vultures. Given the proximity of the historical and existing nest locations and the availability of food to the proposed mine development area, displacement impacts associated with habitat loss and disturbance are far more likely for White-backed Vultures and may result in breeding failure if unmitigated. Similarly, collision and electrocution impacts associated with the power line infrastructure are potentially additional sources of direct mortality.

Lappet-faced Vulture inhabits dry savannah habitats, with tall isolated trees such as *Acacia, Balanites* and *Terminalia* that are utilised for roosting and breeding activities. Lappet-faced Vultures often build only one nest, although it is also common to have one to three nests that are used alternately. Little is known about the breeding locations of Lappet-faced Vultures in the broader study area, however the presence of large trees within the study area offering a suitable nesting substrate means that breeding (nest) locations cannot be discounted. Similarly, the proximity of potential nest locations and the availability of food to the proposed mine development area, displacement impacts associated with habitat loss and disturbance are likely for Lappet-faced Vultures and may result in breeding failure if unmitigated. Similarly, collision and electrocution impacts associated with the power line infrastructure are potentially additional sources of direct mortality.

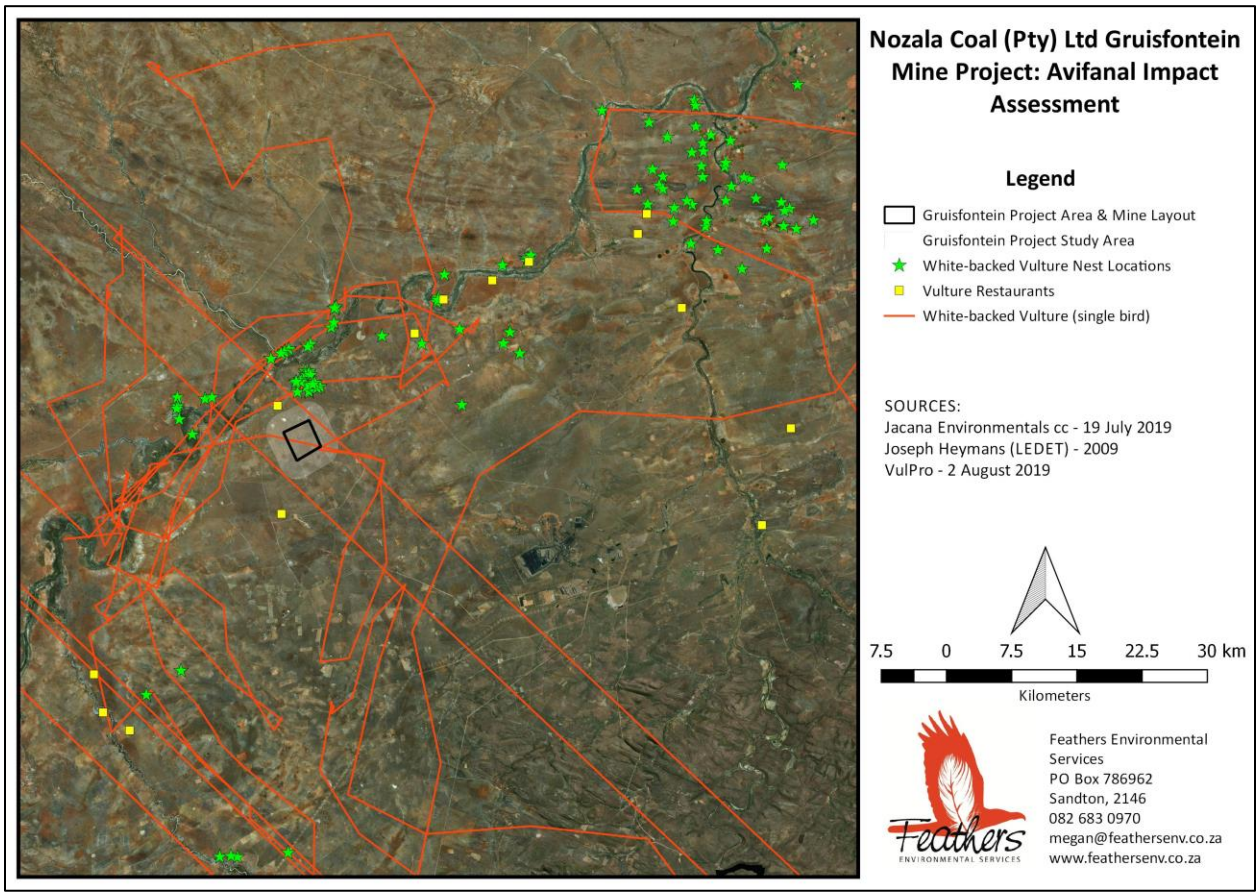

FIGURE 5: White-backed Vulture nest locations, White-backed Vulture tracking data for a single bird and vulture restaurant locations in relation of the proposed Gruisfontein Mine and its associated infrastructure.

4.1.4. Primary Data Collection

A single winter survey was conducted on 22-24 July 2019. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available at the proposed mine development site and within the larger study area by applying the following techniques:

a. Focal Site Surveys

Focal sites are any identifiable features within the landscape that support avifauna (e.g. a roost or nesting site) or have the potential to support breeding pairs or large densities of avifauna (e.g. dams, wetlands, river systems). Five focal sites (FIGURE 6) were established within the study area and the broader surrounds and are representative of waterbodies (pans), potential nesting locations and a vulture restaurant. No water dependent species were recorded during the surveys of the two pans (Focal Sites 1 & 2) as both pans were largely dry, which was expected due to the timing of the site visit. Landowners of the respective properties however confirmed the presence of an abundance and diversity of species when the pans are full, including Greater Flamingo *Phoenicopterus roseus*. It is important to note, that a vulture restaurant has been established on the periphery of the pan at Focal Site 1. Feeding occurs regularly at this location, particularly during the hunting season. White-backed Vulture, Lappet-faced Vulture and Cape Vulture were observed flying above the restaurant during the survey. This restaurant is undoubtedly an important food source for the breeding White-backed Vulture and Lappet-faced Vulture, including the transient Cape Vulture.

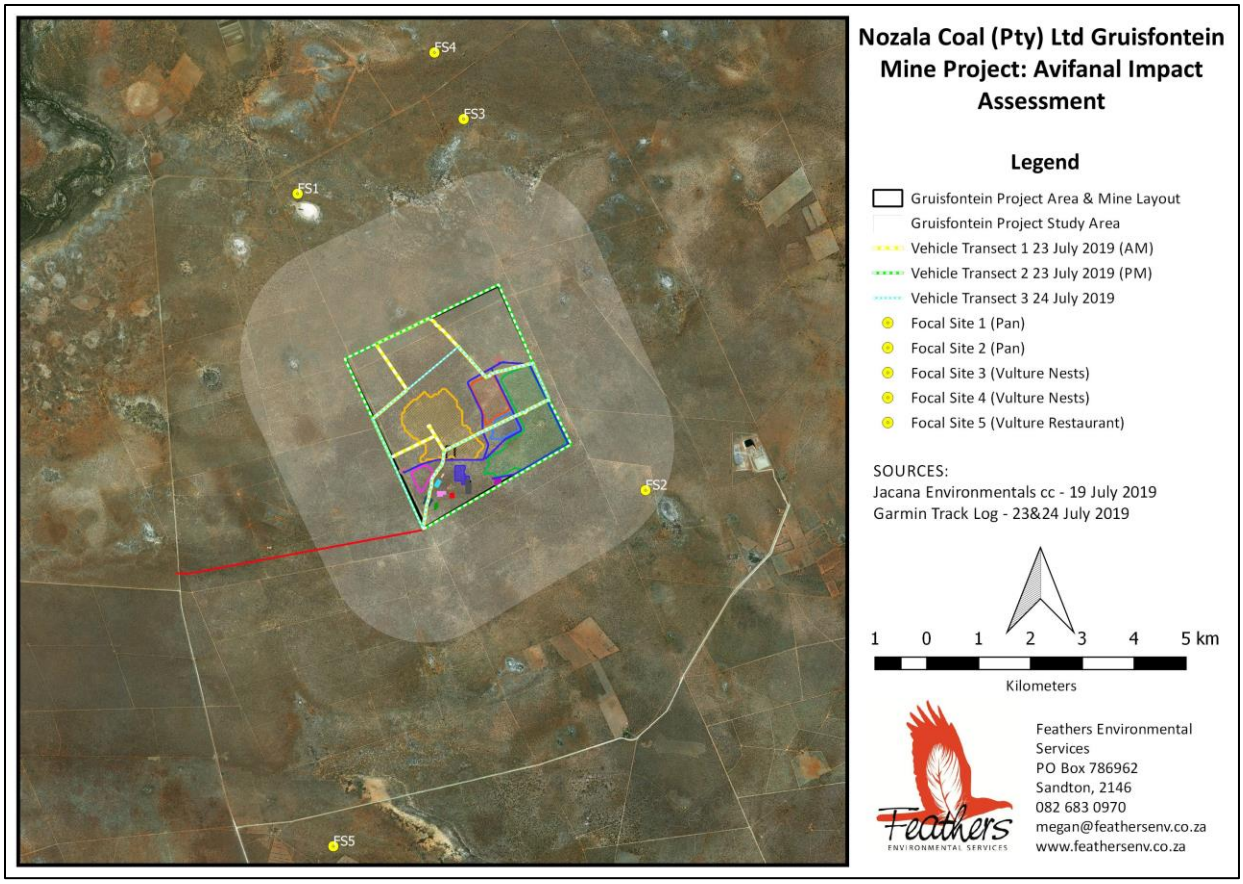

FIGURE 6: Location of the five Focal Sites and three Vehicle Transects within the proposed Gruisfontein Project site and its immediate surrounds.

Focal Sites 3 and 4 were established on two properties north of the Gruisfontein Mine location (i.e. Pentonville 216LQ and Sussex 17LQ respectively). Both farms support a concentration of White-backed Vulture nests (Joseph Heymans, 2009). Unfortunately, several of the nests that were surveyed during the July 2019 site visit were no longer active or present within the trees. Three White-backed nests remain active on the Pentonville property (pers comms Mr.B Pelser, landowner of Pentonville 216LQ). In addition, a 'new' nest location was identified on the Sussex property within close proximity to a historical nest, but this nest was inactive too (APPENDIX 1: FIGURE 8).

The remaining focal site (Focal Site 5) was established on the Houwhoek 270LQ property approximately 6km south west of the Gruisfontein property. This property was reported to have a vulture restaurant. Discussions with the farm manager of Houwhoek revealed that the vulture restaurant was no longer active. However, vultures were reported to have fed on a carcass, elsewhere on the property, approximately three weeks prior to the July 2019 site visit.

b. Vehicle Transect Survey

Conventionally, this data collection method aims to establish indices of abundance for large terrestrial species and raptors. However, given that a large proportion of the Gruisfontein property were traversed by the identified vehicle transects, **all species** encountered (observed and heard) during the site visit were recorded. Three Vehicle Transect (VT) counts were established on suitable roads within the Gruisfontein 230LQ property, totalling approximately 37 kilometres (FIGURE 6). Thirty-six species were recorded along the transects with relatively low densities recorded for each species (TABLE 4.2). Southern Masked-Weaver *Ploceus velatus* recorded the highest density with 117 individuals observed, followed by Red-billed Quelea *Quelea quelea* (n=103) and Red-faced Mousebird *Urocolius indicus* (n=94). African Red-eyed Bulbul *Pycnonotus nigricans*, Golden-breasted Bunting *Emberiza flaviventris*, Southern Yellow-billed Hornbill *Tockus leucomelas*, Cape Turtle-Dove *Streptopelia capicola*, Blue Waxbill *Uraeginthus angolensis* and Violet-eared Waxbill *Uraeginthus granatinus* were also recorded frequently with numbers ranging from 11-31 individuals. VT3 yielded the highest density of individual birds (n=217) with VT1 recording very similar densities (n= 215) of individual birds observed. Both these transects traverse areas that contain feeding and drinking stations for the resident cattle and game and are drawcards for the many avifaunal species. A large proportion of the recorded observations were made at these locations. VT2 followed the Gruisfontein 230LQ property boundary and a notable decrease in the diversity and abundance of individual birds (n=123) was observed.

c. Incidental Observations

In an effort to maximise the benefit from the time spent on site travelling to and from survey points, all birds observed during this time were recorded using an incidental data collection technique (TABLE 4.3). Twenty species were observed over the three-day survey period, totalling 66 individual birds.

TABLE 4.2 Vehicle Transect Summary Data

SPECIES	SCIENTIFIC NAME	#BIRDS	#RECORDS
Babbler, Southern Pied	*Turdoides bicolor*	10	2
Barbet, Acacia Pied	*Tricholaema leucomelas*	1	1
Batis, Chinspot	*Batis molitor*	5	5
Bee-eater, Little	*Merops pusillus*	7	6
Buffalo-weaver, Red-billed	*Bubalornis niger*	6	1
Bulbul, African Red-eyed	*Pycnonotus nigricans*	31	13
Bunting, Golden-breasted	*Emberiza flaviventris*	21	9
Drongo, Fork-tailed	*Dicrurus adsimilis*	9	8
Finch, Scaly-feathered	*Sporopipes squamifrons*	6	3
Flycatcher, Marico	*Bradornis mariquensis*	5	5
Francolin, Crested	*Dendroperdix sephaena*	7	2
Go-away-bird, Grey	*Corythaixoides concolor*	7	5
Hoopoe, African	*Upupa africana*	1	1
Hornbill, African Grey	*Tockus nasutus*	6	6
Hornbill, Southern Yellow-billed	*Tockus leucomelas*	11	9
Korhaan, Red-crested	*Lophotis ruficrista*	2	2
Lark, Sabota	*Calendulauda sabota*	4	4
Masked-weaver, Southern	*Ploceus velatus*	117	10
Mousebird, Red-faced	*Urocolius indicus*	94	12
Oxpecker, Red-billed	*Buphagus erythrorynchus*	7	3
Pipit, African	*Anthus cinnamomeus*	3	3
Quelea, Red-billed	*Quelea quelea*	103	6
Roller, Lilac-breasted	*Coracias caudatus*	10	9
Roller, Purple	*Coracias naevius*	4	4
Sandgrouse, Double-banded	*Pterocles bicinctus*	5	3
Scimitarbill, Common	*Rhinopomastus cyanomelas*	2	2
Scrub-robin, White-browed	*Erythropygia leucophrys*	1	1
Snake-eagle, Black-chested	*Circaetus pectoralis*	1	1
Tchagra, Black-crowned	*Tchagra senegalus*	2	2
Turtle-dove, Cape	*Streptopelia capicola*	13	9
Vulture, Cape	*Gyps coprotheres*	3	2
Vulture, Lappet-faced	*Torgos tracheliotos*	1	1
Vulture, White-backed	*Gyps africanus*	6	1
Waxbill, Black-faced	*Estrilda erythronotos*	4	1
Waxbill, Blue	*Uraeginthus angolensis*	22	9
Waxbill, Violet-eared	*Uraeginthus granatinus*	18	8

TABLE 4.3 Incidental Sightings Summary Data

SPECIES	SCIENTIFIC NAME	#BIRDS	#RECORDS
Bulbul, Dark-capped	*Pycnonotus tricolor*	1	1
Crow, Pied	*Corvus albus*	1	1
Dove, Namaqua	*Oena capensis*	1	1
Go-away-bird, Grey	*Corythaixoides concolor*	3	2
Goshawk, Gabar	*Melierax gabar*	1	1
Goshawk, Southern Pale Chanting	*Melierax canorus*	1	1
Guineafowl, Helmeted	*Numida meleagris*	9	1
Helmet-shrike, White-crested	*Prionops plumatus*	6	2
Hornbill, African Grey	*Tockus nasutus*	1	1
Hornbill, Southern Yellow-billed	*Tockus leucomelas*	5	3
Korhaan, Red-crested	*Lophotis ruficrista*	2	2
Lapwing, Blacksmith	*Vanellus armatus*	1	1
Mousebird, Red-faced	*Urocolius indicus*	9	2
Roller, Lilac-breasted	*Coracias caudatus*	1	1
Shrike, Crimson-breasted	*Laniarius atrococcineus*	1	1
Shrike, Magpie	*Corvinella melanoleuca*	1	1
Sparrow-weaver, White-browed	*Plocepasser mahali*	11	2
Starling, Burchell's	*Lamprotornis australis*	1	1
Starling, Cape Glossy	*Lamprotornis nitens*	5	2
Turtle-dove, Cape	*Streptopelia capicola*	5	2

Several passerine nests were observed during the survey, mostly belonging to Southern Masked Weavers. The faunal assessment conducted in January 2019, noted a large solitary nest observed within the study area. This nest was not present during the July 2019 survey, however communication with Mr. Hein Schonfeldt (Gruisfontein 230LQ property owner) revealed that the nest was occupied by a pair of Wahlberg's Eagles *Hieraaetus wahlbergi*, that bred successfully in the nest on a couple of occasions (FIGURE 7 and APPENDIX 1: FIGURE 9). A severe hailstorm in the area destroyed the nest and the birds have not returned. Mr. Schonfeldt also confirmed the presence of breeding Western Barn Owls *Tyto alba* at the homestead (FIGURE 7). No other raptor nests or other possible breeding sites were noted during the site survey.

The site visit produced a combined list of 49 species (APPENDIX 2 - highlighted in grey), covering both the project development area and to a limited extent, the surrounding area. With the exception of the three vulture species, observed flying above the project location, no additional Red List species were observed during the site visit. Most observations were of small passerine species that are common to this area. Each of these species has the potential to be displaced by the proposed Gruisfontein Mine Project as a result of habitat transformation and disturbance. However, these species have persisted despite existing disturbance within the study area. This resilience, coupled with the fact that similar habitat is available throughout the broader area, means that the displacement impact will not be of regional or national significance.

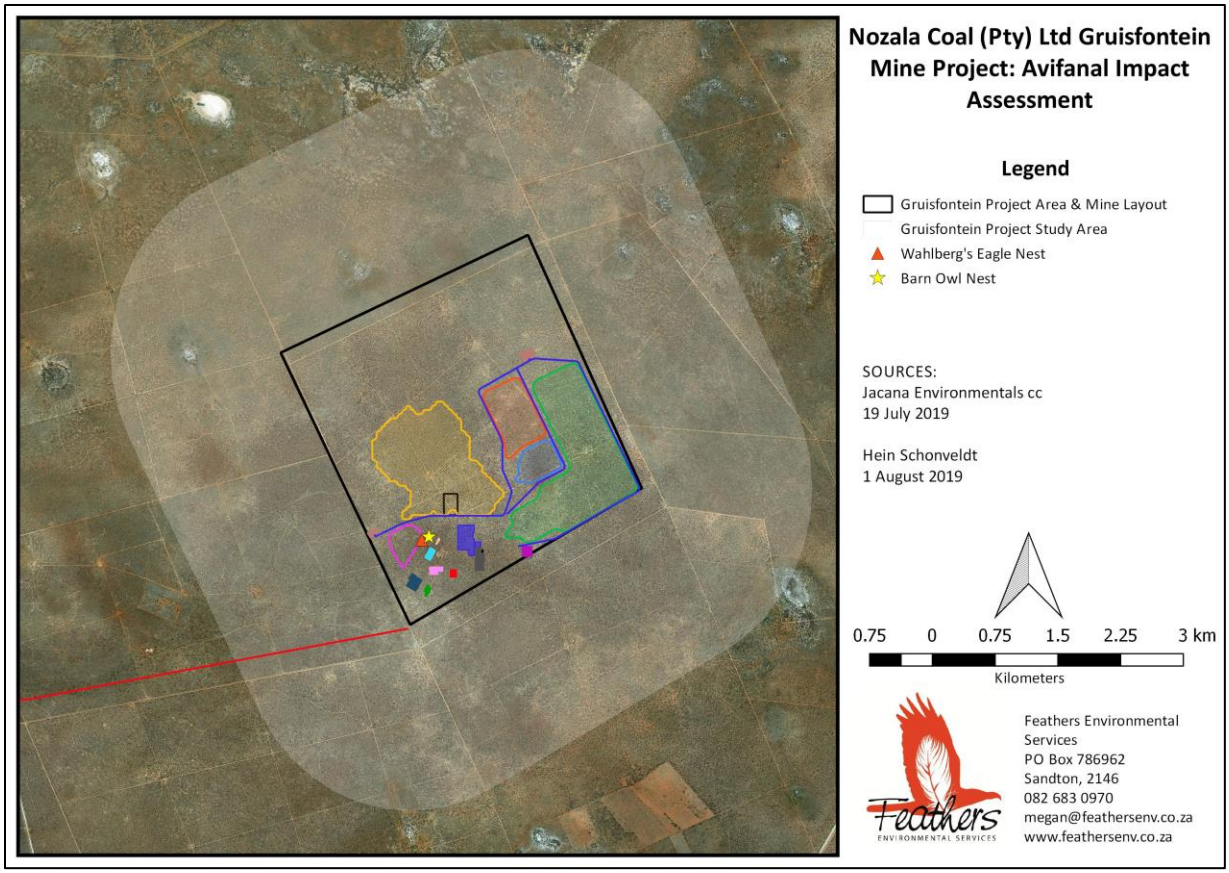

FIGURE 7: Location of the Wahlberg's Eagle (historical) and Western Barn Owl nests within the proposed Gruisfontein Project site.

4.2 Bird Habitat Classes

Vegetation is one of the primary factors determining bird species distribution and abundance in an area. The following description of the vegetation on the site focuses on the vegetation structure and not species composition, since it is widely accepted within ornithological circles that vegetation structure is more important in determining which bird species will occur there. The classification of vegetation types is from Mucina & Rutherford (2006 and 2012), while from an avifaunal perspective, the Atlas of southern African Birds (SABAP1) recognises six primary vegetation divisions or biomes within South Africa, namely (1) Fynbos (2) Succulent Karoo (3) Nama Karoo (4) Grassland (5) Savanna and (6) Forest (Harrison et al. 1997). Whilst much of the distribution and abundance of bird species can be attributed to the broad vegetation types present in an area, it is the smaller spatial scale habitats (microhabitats) that support the requirements of a particular bird species that need to be examined in greater detail. Microhabitats are shaped by factors other than vegetation, such as topography, land use, food availability, and various anthropogenic factors all of which will either attract or deter birds and are critically important in mapping the site in terms of avifaunal sensitivity and ultimately informing mitigation requirements.

Investigation of the proposed development area and its immediate surrounds, revealed the following bird micro habitats, with APPENDIX 1 providing a photographic record of the bird habitats:

4.2.1. Savanna (Woodland)

The proposed development area is located within a single primary vegetation division namely the Savanna Biome which is defined by SABAP1 as having a grassy under-storey and a distinct woody upper-storey of trees and tall shrubs (Harrison *et al* 1997). The Gruisfontein property is comprised of Limpopo Sweet Bushveld vegetation (APPENDIX 1 - FIGURE 1). The Limpopo Sweet Bushveld vegetation type extends from the Crocodile and Marico rivers down the Limpopo river valley into the tropics past Tom Burke. The landscape features plains and some undulating areas with thickets of *Acacia erubescens*, *Acacia mellifera* and *Dichrostachys cinerea* in disturbed areas (Mucina & Rutherford, 2006). Pristine bushveld features prominently within the development area, with smaller pockets of disturbed woodland habitat associated high 'traffic areas' surrounding the homestead, as well as the cattle feeding and drinking stations (APPENDIX 1 - FIGURE 2).

The savanna/woodland biome contains a large variety of bird species (it is the most species-rich community in southern Africa) but very few bird species are restricted to this biome. It is also relatively well conserved compared to the grassland biome. Savanna is particularly rich in raptors, and forms the stronghold for Red List species (recorded in the broader project area by SABAP2) such as Bateleur *Terathopius ecaudatus*, Martial Eagle, Tawny Eagle, Lanner Falcon, African White-backed Vulture and Lappet-faced Vulture. Apart from Red List species, it also supports several non-Red List raptor species, such as Wahlberg's Eagle*,* Brown Snake-Eagle *Circaetus cinereus*, the migratory Steppe Buzzard *Buteo vulpinus*, African Harrier Hawk, Jackal Buzzard, *and* African Hawk Eagle *Aquila spilogaster*. Apart from raptors, woodland in its undisturbed state is suitable for a wide range of other, non-raptorial Red List species, including Kori Bustard *Ardeotis kori*, Marabou Stork *Leptoptilos crumeniferus*, Abdim's Stork *Ciconia abdimii* and European Roller *Coracias garrulus.*

4.2.2. Waterbodies (Pans and Farm Reservoirs)

Pans are endorheic wetlands having closed drainage systems; water usually flows in from small catchments but with no outflow from the pan basins themselves. They are typical of poorly drained, relatively flat and dry regions. Water loss is mainly through evaporation, sometimes resulting in saline conditions, especially in the most arid regions. Water depth is shallow (<3m) with flooding characteristically ephemeral (Harrison *et al*. 1997). When these pans hold water (which is only likely after exceptional rainfall events), they could attract waterbirds, while large raptors and vultures could use them for bathing and drinking. When the pans are dry, they may be covered with grass, which is attractive to several large terrestrial species for foraging, roosting and breeding (APPENDIX 1: FIGURE 3, 4, 5 and 6). Man-made impoundments (boreholes, dams and those waterbodies linked to mining activities) although artificial in nature, can be very important for variety of species (APPENDIX 1: FIGURE 7). Their presence in the study area is an indicator of a higher habitat loss and disturbance risk.

Red List species recorded in the study area by SABAP 2 that are likely to be attracted to the pans include Greater Flamingo, Yellow-billed Stork *Mycteria ibis,* Saddle-billed Stork *Ephippiorhynchus senegalensis,* Greater Painted-snipe *Rostratula benghalensis* and Black-winged Pratincole *Glareola nordmanni.* Common species in the study area that may utilise the pans include Comb Duck *Sarkidiornis melanotos*, Yellow-billed Duck *Anas undulata*, Common Greenshank *Tringa nebularia*, Egyptian Goose *Alopochen aegyptiacus*, Ruff *Philomachus pugnax*, Blacksmith Lapwing

Vanellus armatus, Crowned Lapwing *Vanellus coronatus*, African Sacred Ibis *Threskiornis aethiopicus* and Hadeda Ibis *Bostrychia hagedash.*

5. GENERAL DESCRIPTION OF BIRD INTERACTIONS WITH ELECTRICAL INFRASTRUCURE

Poorly sited or designed facilities and infrastructure can negatively impact not only vulnerable species and habitats, but also entire ecological processes. The effects of any development on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and diversity of species present. With so many variables involved, the impacts of each development must be assessed individually. Each of these potential effects can interact, either increasing the overall impact on birds or, in some cases, reducing a particular impact (for example where habitat loss and disturbance causes a reduction in birds using an area which may then reduce the risk of collision). The principal areas of concern for Red List species related to the Gruisfontein Mine and its ancillary infrastructure are:

* Displacement due to habitat loss within the physical infrastructure footprint;
* Displacement due to disturbance associated with construction, operation and decommissioning of the mine facility and its associated infrastructure;
* Mortality due to electrocution on the 22kV power line poles/towers;
* Mortality due to electrocution within the substation yard;
* Mortality due to collision with the conductors of the 22kV power lines; and
* Mortality due to collision with motor vehicles.

5.1 Displacement as a result of habitat loss or transformation

This impact is dependent on the location and the scale of the facility. Extensive areas of vegetation (habitat) will be cleared to accommodate the considerable amount of infrastructure required, reducing the amount of habitat available to birds for foraging, roosting and breeding (Smallie, 2013). The effect of the vegetation clearing is always more marked in woodland areas, where construction necessitates the removal of woody plants, and especially large trees. The study area is comprised largely of undisturbed woodland. Despite low report rates, it almost certainly supports a number of Red List raptor species such as White-backed Vulture, Lappet-faced Vulture, Martial Eagle, Tawny Eagle and Bateleur, and also non-raptors such as Southern Ground Hornbill, Kori Bustard and Marabou Stork that may utilize the area, albeit only irregularly for some species. Most observations were of small passerine species that are common to this area. While each of these species has the potential to be displaced by the construction of the mine and its associated infrastructure, identical habitat features prominently in the surrounding areas providing alternate foraging, roosting and breeding areas for the passerine species observed. The clearing of woodland (mostly small trees and woody shrub) is likely to have a moderate impact on the avifauna and is unlikely to be of regional or national significance, provided that large trees are not removed, particularly the area north of the proposed mine layout. The displacement impact on the local avifauna as a result of habitat loss is rated to be of **HIGH** significance as far as Red List species are concerned.

5.2 Displacement as a result of disturbance

Excavation and construction activities are a source of significant disturbance particularly as a result of the machinery and construction personnel that are present on site for the duration of the construction, operation and decommissioning of the proposed mine and its ancillary infrastructure. For most bird species, construction activities are likely to be a cause of temporary disturbance impacting on foraging, and roosting behaviours but in more extreme cases, construction may impact on the breeding success of certain species particularly if the disturbance happens during a critical part of the breeding cycle, resulting in temporary breeding failure or permanent nest abandonment. Both the study area and its broader surrounds have supported and to a large degree still provide suitable breeding habitat for a variety of species, particularly White-backed Vulture.

Some bird species (e.g. gamebirds, bustards and plovers) exhibit highly terrestrial behaviour (walking) and are often loathe to take flight under normal circumstances (Allan, 2013). Home-range, territorial and daily-movement patterns for some of these species could potentially be impacted by the mine and road construction through the areas that they inhabit. In addition, these species have young that capable of moving around on foot soon after hatching which means that the family unit spends a considerable amount of time walking and foraging within their territory. These daily movement patterns are likely to be shortened by the barriers created by the mine and associated road infrastructure. Species commuting around the area may become disorientated, avoid the site and fly longer distances than usual as a result, and for some species this may have critical energy implications (Smallie, 2013).

This impact is anticipated to be of **MEDIUM** significance and temporary as far as Red List species are concerned. Should this development be authorised, a detailed inspection would be required to establish if there are any breeding Red List species present on the property and to confirm whether the Western Barn Owls are still actively breeding at the homestead. In the event of the identification of a Red List species nest during this pre-construction inspection, appropriate mitigation measures would need to be implemented (such as postponing the construction to avoid peak breeding season).

5.3 Direct mortality as a result of construction activity

Bird mortality as a result of construction activities is improbable because birds are incredibly mobile and able to move out of harm's way. If mortality does occur, it is likely to be confined to a localised area and restricted to immobile species e.g. nestlings. No terrestrial bird species (ground) nest locations were observed during the site visit to the study area. Although this may be a factor of the timing of the site visit, the absence of Red List species nests may also be a result of the disturbance in the area and the resultant low report rates for large terrestrial species. Therefore, the impact on nestlings is rated to be of **LOW** significance. Should nests or breeding locations, pertaining to Red List species, be identified during the avifaunal inspection prior to the construction phase of this project, site specific mitigation must be implemented to ensure that this impact is reduced to negligible levels.

5.4 Mortality due to electrocution on the 22kV power line infrastructure

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Electrocution risk is strongly influenced by the power line voltage and the design of the pole/tower structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. This is particularly likely when more than one bird attempts to sit on the same pole/tower, a behaviour that is typical of vultures when perching or roosting. This impact is rated to be of **HIGH** significance. The best possible mitigation is the construction of the power line using an Eskom approved bird friendly pole/tower design accordance with the Distribution Technical Bulletin relating to bird friendly structures. Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers may be required.

5.5 Mortality due to electrocution within the onsite substation

Electrocutions within the proposed onsite substation are possible but should not affect the more sensitive Red List bird species as these species are unlikely to use the infrastructure within the yard for perching or roosting. The risk of electrocution within the substation is therefore evaluated to be of **LOW** significance. Since it is difficult to predict with any certainty where birds are likely to nest within the substation, coupled with the costs associated with insulating the infrastructure, electrocutions will need to be mitigated using site-specific recommendations if and when they occur.

5.6 Mortality due to collision with the overhead power line conductors

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds and birds colliding with power lines (Ledger and Annegarn 1981; Ledger 1983; Ledger 1984; Hobbs and Ledger 1986a; Hobbs and Ledger 1986b; Ledger, Hobbs and Smith, 1992; Verdoorn 1996; Kruger and Van Rooyen 1998; Van Rooyen 1998; Kruger 1999; Van Rooyen 1999; Van Rooyen 2000; Anderson 2001; Shaw 2013).

Collisions are the biggest single threat posed by power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited maneuverability, 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 List species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the 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.

In a recent PhD study, Shaw (2013) provides a concise summary of the phenomenon of avian collisions with power lines:

"*The collision risk posed by power lines is complex and problems are often localised. While any bird flying near a power line is at risk of collision, this risk varies greatly between different groups of birds, and depends on the interplay of a wide range of factors (APLIC 1994). Bevanger (1994) described these factors in four main groups – biological, topographical, meteorological and technical. Birds at highest risk are those that are both susceptible to collisions and frequently exposed to power lines, with waterbirds, gamebirds, rails, cranes and bustards usually the most numerous reported victims (Bevanger 1998, Rubolini et al. 2005, Jenkins et al. 2010).*

The proliferation of man-made structures in the landscape is relatively recent, and birds are not evolved to avoid them. Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ratio of body weight to wing area) most at risk (Bevanger 1998, Janss 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles. Vision is another key biological factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the low-resolution and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw 2010, Martin 2011, Martin et al. 2012). Behaviour is important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision (Bevanger 1994). Experience affects risk, with migratory and nomadic species that spend much of their time in unfamiliar locations also expected to collide more often (Anderson 1978, Anderson 2002). Juvenile birds have often been reported as being more collision-prone than adults (e.g. Brown et al. 1987, Henderson et al. 1996).

Topography and weather conditions affect how birds use the landscape. Power lines in sensitive bird areas (e.g. those that separate feeding and roosting areas, or cross flyways) can be very dangerous (APLIC 1994, Bevanger 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (Bevanger 1994). Inclement weather can disorient birds and reduce their flight altitude, and strong winds can result in birds colliding with power lines that they can see but do not have enough flight control to avoid (Brown et al. 1987, APLIC 1994).

The technical aspects of power line design and siting also play a big part in collision risk. Grouping similar power lines on a common servitude, or locating them along other features such as tree lines, are both approaches thought to reduce risk (Bevanger 1994). In general, low lines with short span lengths (i.e. the distance between two adjacent pylons) and flat conductor configurations are thought to be the least dangerous (Bevanger 1994, Jenkins et al. 2010). On many higher voltage lines, there is a thin earth (or ground) wire above the conductors, protecting the system from lightning strikes. Earth wires are widely accepted to cause the majority of collisions on power lines with this configuration because they are difficult to see, and birds flaring to avoid hitting the conductors often put themselves directly in the path of these wires (Brown et al. 1987, Faanes 1987, Bevanger 1994)."

A potential impact of the proposed 22kV power lines is collisions with the overhead conductors. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because such a huge number of variables play a role in determining the risk, for example weather, rainfall, wind, age, flocking behaviour, power line

height, light conditions, topography, population density and so forth. However, from incidental record keeping by the Endangered Wildlife Trust: Wildlife & Energy Programme it is possible to give a measure of what species are likely to be impacted upon (see FIGURE 8 below - Jenkins et al. 2010). This only gives a measure of the general susceptibility of the species to power line collisions, and not an absolute measurement for any specific line.

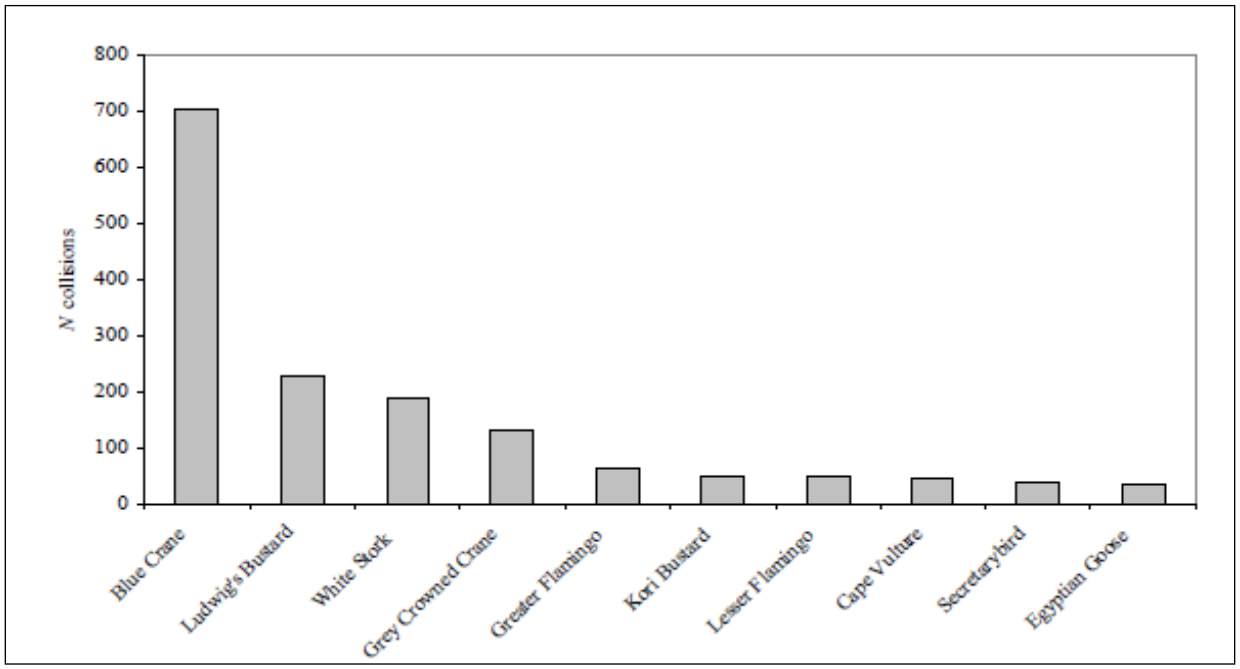

FIGURE 8: The top ten collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/EWT Strategic Partnership central incident register 1996 - 2007 (Jenkins et al. 2010)

Relevant to this development, collisions are likely to be linked to specific habitat types and/or specific sets of circumstances. The following high collision potential scenarios, potentially involving Red List species, present themselves in the study area:

- Proximity of breeding Red List raptors and vultures to the proposed power line. In this scenario the young, recently fledged birds would be most at risk of collisions. Species typically at risk would be White-backed Vulture, Martial Eagle and Tawny Eagle in the woodland biome.
- Power line spans crossing or skirting open woodland areas. Species at risk here are mostly Kori Bustard, Secretarybird, Southern Ground-hornbill, Red-crested Korhaan, Lanner Falcon and Lesser Kestrel.
- Vultures descending to a carcass are at risk of collisions with a nearby power line. Birds will also be at risk when rapidly taking off at the carcass if disturbed by people or mammalian predators.
- Research has revealed that vultures have taken to roosting and perching (sometimes overnight) on electrical infrastructure (Wolter *et al* 2010). Vultures are gregarious by nature and will roost in groups on pole/tower tops. Vultures will often jostle for a suitable position on the pole/tower and may collide with the conductors when doing so.

This impact is rated to be of **MEDIUM** significance. The standard practice to mitigate for avian collision impact is the installation of anti-collision devices on the earth wires. This form of mitigation has proved to be reasonably successful in reducing collisions, with a reduction in mortality of up to 60% (see Jenkins *et al.* 2010). Eskom Distribution has approved two anti-collision devices, commonly referred to as bird flight diverters (BFDs); the Bird Flapper (dynamic) and the Flight Diverter (static). Both have advantages and disadvantages. Dynamic devices are thought to be very effective in reducing collisions as the birds presumably see them very well because of the movement that attracts their attention. The disadvantage of dynamic devices is that they are subject to extensive wear and tear, inevitably limiting the lifespan of the device. This has obvious cost implications if a line needs to be re-marked every few years (Van Rooyen and Diamond, 2015). Static devices are mechanically more durable because they lack the element of wear and tear that moving parts predictably have. Flight diverters should be as large as possible and contrast with the background. Black and white/yellow intermixed patterns are likely to maximise the probability of detection (Martin *et al*. 2010).

5.7 Collisions with motor vehicles

Roadside verges are an attractive habitat to a diversity of bird species (Kaseloo 2006; Pocock & Lawrence 2006; Roach & Kirkpatrick 1985). Vegetation is often dense and lush (when compared to surrounding areas, due to protection from grazing animals and an increased supply water from road surface runoff) supporting high densities of rodents that in turn attract predatory birds such as owls, raptors and herons. Swallows and swifts, are attracted to culverts and bridges because of the nesting opportunities they provide. For these species, that are attracted to roads, collisions with motor vehicles are a significant impact. This impact is rated to be of **MEDIUM** significance.

5.8 Impact on the quality of supply of the power line, substation and mine infrastructure

Although this does not form part of the brief, it is important to mention that birds could have an impact on the proposed power line infrastructure, the hardware within the substation and possibly other related mine infrastructure. Both bird streamers and bird pollution occur as a result of birds perching and defecating on the pole tops and, often directly above live conductors causing electrical faults on power lines. The more faults that occur on a line, the poorer the quality of electrical supply to the end users (i.e. the mine). Site specific mitigation can be applied reactively should this impact occur.

5.9 Nesting

Bird nests may also cause faults through nest material, protruding into the air gap between live components on the power line and substation infrastructure. Crows in particular often incorporate wire and other conductive material into their nests. When nests cause flashovers, the nesting material may catch fire. This in turn can lead to equipment damage or a general veld fire. Apart from the cost of replacing damaged equipment, the resultant veld fire can lead to claims for damages from landowners. Power line poles/towers in turn provide nesting substrate for certain bird species, some of which might benefit through the increased availability of nesting substrates both on the power line and substation infrastructure as well as the mine offices and plant infrastructure. Site specific mitigation can be applied reactively should this impact occur.

6. ASSESSMENT OF EXPECTED IMPACTS

A quantitative methodology was used to describe, evaluate and rate the significance of the aforementioned impacts associated with the construction, operation and decommissioning of the proposed Gruisfontein Mine Project and its ancillary infrastructure. This assessment is presented in tabular format below for both pre- and post-mitigation according to set criteria described in APPENDIX 3. The potential impacts of the proposed Gruisfontein Mine and its ancillary infrastructure on the avifaunal community have been assessed separately given the characteristics of each development.

CONSTRUCTION PHASE									
Impact description	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance (pre-mitigation)**	**Significance (post-mitigation)**	**Reversibility**	**Mitigation**	**Confidence level**
IMPACT 1: Displacement of Red List species as a result of habitat loss or transformation									
Avifaunal habitat is cleared to accommodate the Gruisfontein Mine and its ancillary infrastructure (including the proposed power line and roads), reducing the amount of habitat available to birds for foraging, roosting and breeding	**Local (2)**	**Permanent (5)**	**High (8)**	**Definite (5)**	**HIGH (75)**	**MEDIUM (52)**	**Low**	* Construction activity should be restricted to the immediate footprint of the infrastructure. **The recommendations of the ecological study must be strictly implemented.** * Access to the remainder of the site must be strictly controlled to prevent unnecessary disturbance of Red List species. * Maximum use should be made of existing roads and the construction of new roads must be kept to a minimum. New roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats. * Bi-annual post construction monitoring to be conducted to assess actual impacts, determine diversity trends & assess mitigation efficacy, particularly with regards to vultures.	**High**

Impact description	Extent	Duration	Magnitude	Probability	Significance (without mitigation)	Significance (with mitigation)	Reversibility	Mitigation	Confidence level
IMPACT 2: Displacement of Red List species as a result of disturbance									
Displacement as a result of disturbance associated with the construction of the Gruisfontein Mine and its ancillary infrastructure (i.e. noise and movement of construction and operational equipment and personnel) resulting in a negative direct impact on the resident avifauna.	**Local (2)**	**Short term (2)**	**High (8)**	**Highly probable (4)**	**MEDIUM (48)**	**MEDIUM (40)**	**Moderate**	* A pre-construction inspection (walk-through) of the final mine layout, road and power line routes must be conducted to identify Red List species that may be breeding within footprint of the mine and the road and power line servitudes to ensure that the impacts to breeding species (if any) are adequately managed. * Construction activity should be restricted to the immediate footprint of the infrastructure. * Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of Red List species. * Bi-annual post construction monitoring using a variety of comparable survey techniques to assess actual impacts, determine diversity trends & assess mitigation efficacy, particularly with regards to vultures.	**High**

Impact description	Extent	Duration	Magnitude	Probability	Significance (without mitigation)	Significance (with mitigation)	Reversibility	Mitigation	Confidence level
IMPACT 3: Direct mortality of Red List species as a result of construction activities									
Mortality of Red List nestlings as a result of the construction of the Gruisfontein Mine and its ancillary infrastructure (i.e. noise and movement of construction and operational equipment) resulting in a negative direct impact on the resident avifauna.	**Local (2)**	**Short term (2)**	**High (8)**	**Improbable (2)**	**LOW (24)**	**LOW (20)**	**High**	* A pre-construction inspection (avifaunal walk-through) of the final mine layout, road and power line routes must be conducted to identify Red List species that may be breeding within footprint of the mine and the road and power line servitudes to ensure that the impacts to breeding species (if any) are adequately managed.	**High**
OPERATIONAL PHASE									
IMPACT 1: Mortality of Red List species due to collision with the 22kV power line conductors									
Collisions of Red List avifauna with the conductors of the proposed 22kV power line, resulting in a negative direct mortality impact, particularly large terrestrial birds and to a lesser extent raptors.	**Regional (3)**	**Long term (4)**	**Moderate (6)**	**Probable (3)**	**MEDIUM (39)**	**LOW (26)**	**High**	* Every effort must be made to select a route that poses the least risk to birds, avoiding key avifaunal habitat and where possible routing the proposed power lines alongside other infrastructure in an effort to increase conductor visibility * High risk sections of power line must be identified by a qualified avifaunal specialist during the pre-construction inspection (walk-through) phase of the project, once the alignment has been	**High**

								finalized. If power line marking is required, bird flight diverters must be installed according to industry standard guidelines. * Bird flight diverters to be maintained on sections of power line during the operational life span of the 22kV power line. * Post construction monitoring to include power line surveys to evaluate collision mortality and assess the efficacy of mitigation measures.	
Impact description	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance (without mitigation)**	**Significance (with mitigation)**	**Reversibility**	**Mitigation**	**Confidence level**
IMPACT 2: Mortality of Red List species due to electrocution on the power line poles/towers									
Electrocutions of Red List avifauna on the live and earthed components on the 22kV power line poles/towers**,** resulting in a negative direct mortality impact.	**Regional (3)**	**Long term (4)**	**High (8)**	**Highly Probable (4)**	**HIGH (60)**	**LOW (26)**	**High**	* The 22kV power line must be constructed using a bird friendly structure (i.e. Inverted Delta-T Structure) * Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must also be considered. * Insulating material to be maintained during the operational life span of the 22kV power line. * Post construction monitoring to include power line surveys to evaluate electrocution mortality and assess the efficacy of mitigation measures.	**High**

Impact description	Extent	Duration	Magnitude	Probability	Significance (without mitigation)	Significance (with mitigation)	Reversibility	Mitigation	Confidence level
IMPACT 2: Mortality of Red List species due to electrocution within the onsite substation									
Electrocutions of Red List avifauna on the live and earthed components within the onsite substation, resulting in a negative direct mortality impact.	**Local (2)**	**Long term (4)**	**Moderate (6)**	**Improbable (2)**	**LOW (24)**	**LOW (12)**	**High**	* Should electrocutions occur within the onsite substation yard, mitigation can be applied reactively using a range of insulation devices. Site-specific recommendations should be sought from a suitably qualified avifaunal specialist, in conjunction with the Endangered Wildlife Trust's Wildlife & Energy Programme.	**High**
IMPACT 4: Mortality of Red List species due to collisions with motor vehicles									
Collisions of Red List avifauna with the motor vehicles utilising both the proposed access and internal roads resulting in a negative direct mortality impact.	**Local (2)**	**Long term (4)**	**High (6)**	**Probable (3)**	**MEDIUM (36)**	**LOW (24)**	**High**	* Vehicles must utilise existing roads only. * Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions. * Awareness initiatives to educate road users about the presence of avifaunal species utilising the roads, particularly during dusk and dawn periods. * Should collisions persist site-specific recommendations to be sought from a suitably qualified avifaunal specialist in conjunction with the Endangered Wildlife Trust's Wildlife & Transport Programme.	**High**

7. CONCLUSION & IMPACT STATEMENT

In conclusion, the habitat within which the proposed study area is located is relatively homogenous with little variation in sensitivity (rated to be moderate to high) from an avifaunal perspective. Areas that supported a density of non-Red List species (i.e. cattle feeding and drinking stations) are in fact degraded in habitat terms and unlikely to regularly support a diversity and/or abundance of Red List species. Although the site visit identified two nest locations on the Gruisfontein property, the presence of these do not necessarily increase the sensitivity of the project area given the species breeding at these locations. Therefore, there were no specific areas within the confines of the project boundary that were designated as highly sensitive no-go areas. The construction of the proposed Gruisfontein mine and its ancillary infrastructure will result in impacts of medium to high significance, which can be reduced to low to medium levels through the application of mitigation measures. It is anticipated that sustainable development of the proposed Gruisfontein Mine projects can be achieved with acceptable levels of impact on the resident avifauna subject to the following recommendations:

* A pre-construction inspection (walk-through) of the final mine layout, road and power line routes must be conducted to identify Red List species that may be breeding within footprint of the mine including the road and power line servitudes to ensure that the impacts to breeding species are adequately managed.
* The 22kV power line must be constructed using a bird friendly structure (i.e. Inverted Delta-T Structure).
* Additional mitigation in the form of insulating sleeves on *jumpers* present on strain poles, terminal poles and box transformers must also be considered.
* Insulating material to be maintained during the operational life span of the 22kV power line.
* Should electrocutions occur within the on-site substation yard, mitigation can be applied reactively using a range of insulation devices. Site-specific recommendations should be sought from a suitably qualified avifaunal specialist, in conjunction with the Endangered Wildlife Trust's Wildlife & Energy Programme.
* Every effort must be made to select a power line route that poses the least risk to birds, avoiding key avifaunal habitat and where possible routing the proposed power lines alongside other infrastructure in an effort to increase conductor visibility.
* High risk sections of power line must be identified by a qualified avifaunal specialist during the pre-construction inspection (walk-through) phase of the project, once the alignment has been finalized. If power line marking is required, bird flight diverters must be installed according to industry standard guidelines.
* Bird flight diverters to be maintained on sections of power line during the operational life span of the power line.
* Construction activity should be restricted to the immediate footprint of the infrastructure. **The recommendations of the ecological study must be strictly implemented.**
* Access to the remainder of the site must be strictly controlled to prevent unnecessary disturbance of Red List species.
* Maximum use should be made of existing roads and the construction of new roads must be kept to a minimum. New roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats.

* Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions.
* Awareness initiatives to educate road users about the presence of avifaunal species utilising the roads, particularly during dusk and dawn periods.
* Should bird collisions with motor vehicles persist site-specific recommendations to be sought from a suitably qualified avifaunal specialist in conjunction with the Endangered Wildlife Trust's Wildlife & Transport Programme.
* Bi-annual post construction monitoring to be conducted, using a variety of comparable survey techniques, to assess actual impacts, determine diversity trends & assess mitigation efficacy, particularly with regards to vultures.
* In addition to this, the normal suite of environmental good practices should be applied, such as ensuring strict control of staff, vehicles and machinery on site and limiting the creation of new roads as far as possible.

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APPENDIX 1 – AVIFAUNAL HABITAT OBSERVED WITHIN THE STUDY AREA

FIGURE 1: Typical savanna bushveld observed in the study area

FIGURE 2: Degraded savanna bushveld at feeding and drinking stations on the Gruisfontein property

FIGURE 3: Pan located at Focal Site 1

FIGURE 4: Small accumulation of water at the pan located at Focal Site 1

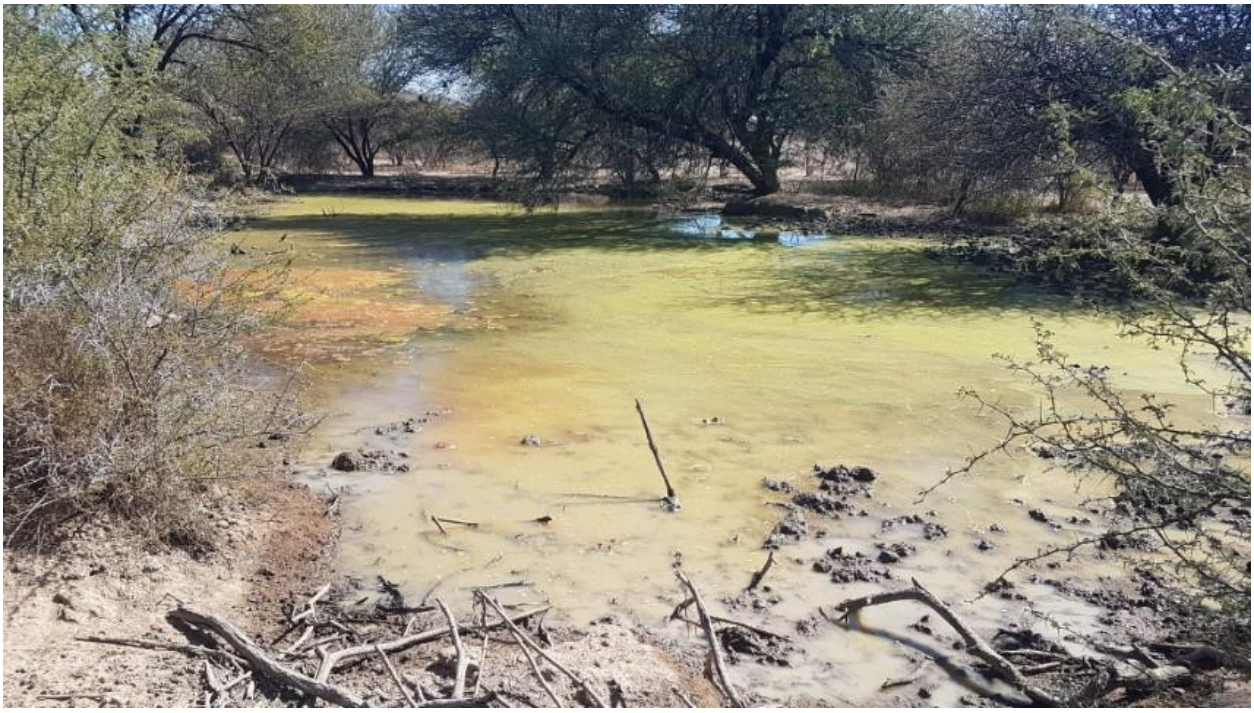

FIGURE 5: Pan located at Focal Site 2

FIGURE 6: Dry areas of the pan located at Focal Site 2

FIGURE 7: An example of small *Eucalyptus* tree stands within the study area

FIGURE 8: An inactive White-backed Vulture nest (centre) located on the Sussex property.

FIGURE 9: Wahlberg's Eagle and chick on the Gruisfontein property *(photo credit: Hein Schonfeldt).*

APPENDIX 2: SOUTH AFRICAN BIRD ATLAS PROJECT DATA (SABAP2) RECORDED IN THE BROADER STUDY AREA (SPECIES OBSERVED DURING THE SITE VISIT ARE INDICATED IN GREY)

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Avocet, Pied	*Recurvirostra avosetta*					10,00	2
Babbler, Arrow-marked	*Turdoides jardineii*					10,00	2
Babbler, Southern Pied	*Turdoides bicolor*				Endemic	65,00	13
Barbet, Acacia Pied	*Tricholaema leucomelas*				Near-endemic	85,00	17
Barbet, Crested	*Trachyphonus vaillantii*					25,00	5
Bateleur	*Terathopius ecaudatus*	NT	EN			20,00	4
Batis, Chinspot	*Batis molitor*					65,00	13
Bee-eater, Blue-cheeked	*Merops persicus*					20,00	4
Bee-eater, European	*Merops apiaster*					40,00	8
Bee-eater, Little	*Merops pusillus*					30,00	6
Bee-eater, Southern Carmine	*Merops nubicoides*					40,00	8
Bee-eater, Swallow-tailed	*Merops hirundineus*					50,00	10
Bee-eater, White-fronted	*Merops bullockoides*					15,00	3
Bishop, Yellow-crowned	*Euplectes afer*					10,00	2
Brubru	*Nilaus afer*					50,00	10
Buffalo-weaver, Red-billed	*Bubalornis niger*					40,00	8
Bulbul, African Red-eyed	*Pycnonotus nigricans*				Near-endemic	45,00	9
Bulbul, Dark-capped	*Pycnonotus tricolor*					25,00	5
Bunting, Cinnamon-breasted	*Emberiza tahapisi*					25,00	5
Bunting, Golden-breasted	*Emberiza flaviventris*					50,00	10
Bush-shrike, Orange-breasted	*Chlorophoneus sulfureopectus*					40,00	8
Bustard, Kori	*Ardeotis kori*	NT	NT			10,00	2
Buttonquail, Kurrichane	*Turnix sylvaticus*					35,00	7
Buzzard, Steppe	*Buteo buteo*					30,00	6
Camaroptera, Grey-backed	*Camaroptera brevicaudata*					10,00	2
Canary, Black-throated	*Crithagra atrogularis*					20,00	4
Canary, Yellow	*Crithagra flaviventris*				Near-endemic	15,00	3
Canary, Yellow-fronted	*Crithagra mozambica*					15,00	3
Chat, Anteating	*Myrmecocichla formicivora*				Endemic	10,00	2
Chat, Familiar	*Cercomela familiaris*					5,00	1
Cisticola, Rattling	*Cisticola chiniana*					30,00	6
Cisticola, Tinkling	*Cisticola rufilatus*					5,00	1
Cormorant, Reed	*Phalacrocorax africanus*					5,00	1
Coucal, Burchell's	*Centropus burchellii*				Near-endemic	10,00	2

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Courser, Bronze-winged	*Rhinoptilus chalcopterus*					15,00	3
Crombec, Long-billed	*Sylvietta rufescens*					75,00	15
Cuckoo, Black	*Cuculus clamosus*					35,00	7
Cuckoo, Diderick	*Chrysococcyx caprius*					20,00	4
Cuckoo, Jacobin	*Clamator jacobinus*					40,00	8
Cuckoo, Klaas's	*Chrysococcyx klaas*					30,00	6
Cuckoo, Red-chested	*Cuculus solitarius*					20,00	4
Cuckooshrike, Black	*Campephaga flava*					5,00	1
Dove, Laughing	*Streptopelia senegalensis*					90,00	18
Dove, Namaqua	*Oena capensis*					95,00	19
Dove, Red-eyed	*Streptopelia semitorquata*					15,00	3
Dove, Rock	*Columba livia*					5,00	1
Drongo, Fork-tailed	*Dicrurus adsimilis*					50,00	10
Duck, Comb	*Sarkidiornis melanotos*					35,00	7
Duck, Maccoa	*Oxyura maccoa*	NT	NT			5,00	1
Duck, White-faced	*Dendrocygna viduata*					35,00	7
Duck, Yellow-billed	*Anas undulata*					10,00	2
Eagle, Martial	*Polemaetus bellicosus*	VU	EN			5,00	1
Eagle, Tawny	*Aquila rapax*	LC	EN			40,00	8
Eagle, Wahlberg's	*Hieraaetus wahlbergi*					15,00	3
Eagle-owl, Spotted	*Bubo africanus*					25,00	5
Egret, Cattle	*Bubulcus ibis*					20,00	4
Egret, Great	*Egretta alba*					5,00	1
Egret, Little	*Egretta garzetta*					15,00	3
Eremomela, Burnt-necked	*Eremomela usticollis*					25,00	5
Eremomela, Yellow-bellied	*Eremomela icteropygialis*					15,00	3
Falcon, Amur	*Falco amurensis*					10,00	2
Falcon, Lanner	*Falco biarmicus*	LC	VU			25,00	5
Finch, Cut-throat	*Amadina fasciata*					5,00	1
Finch, Scaly-feathered	*Sporopipes squamifrons*				Near-endemic	55,00	11
Firefinch, Jameson's	*Lagonosticta rhodopareia*					20,00	4
Firefinch, Red-billed	*Lagonosticta senegala*					5,00	1
Fish-eagle, African	*Haliaeetus vocifer*					20,00	4
Flamingo, Greater	*Phoenicopterus roseus*	LC	NT			5,00	1
Flycatcher, Marico	*Bradornis mariquensis*				Near-endemic	75,00	15
Flycatcher, Spotted	*Muscicapa striata*					10,00	2
Francolin, Crested	*Dendroperdix sephaena*					55,00	11

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Go-away-bird, Grey	*Corythaixoides concolor*					45,00	9
Goose, Egyptian	*Alopochen aegyptiaca*					70,00	14
Goose, Spur-winged	*Plectropterus gambensis*					25,00	5
Goshawk, Gabar	*Melierax gabar*					15,00	3
Goshawk, Southern Pale Chanting	*Melierax canorus*				Near-endemic	55,00	11
Grebe, Little	*Tachybaptus ruficollis*					20,00	4
Greenshank, Common	*Tringa nebularia*					15,00	3
Guineafowl, Helmeted	*Numida meleagris*					85,00	17
Gull, Grey-headed	*Chroicocephalus cirrocephalus*					5,00	1
Hamerkop	*Scopus umbretta*					30,00	6
Harrier, Montagu's	*Circus pygargus*					5,00	1
Harrier-Hawk, African	*Polyboroides typus*					5,00	1
Hawk-eagle, African	*Aquila spilogaster*					10,00	2
Helmet-shrike, White-crested	*Prionops plumatus*					10,00	2
Heron, Black-headed	*Ardea melanocephala*					10,00	2
Heron, Grey	*Ardea cinerea*					5,00	1
Honeyguide, Greater	*Indicator indicator*					15,00	3
Honeyguide, Lesser	*Indicator minor*					5,00	1
Hoopoe, African	*Upupa africana*					25,00	5
Hornbill, African Grey	*Tockus nasutus*					45,00	9
Hornbill, Red-billed	*Tockus rufirostris*					30,00	6
Hornbill, Southern Yellow-billed	*Tockus leucomelas*				Near-endemic	60,00	12
Ibis, African Sacred	*Threskiornis aethiopicus*					15,00	3
Ibis, Glossy	*Plegadis falcinellus*					20,00	4
Ibis, Hadeda	*Bostrychia hagedash*					15,00	3
Jacana, African	*Actophilornis africanus*					5,00	1
Kingfisher, Brown-hooded	*Halcyon albiventris*					5,00	1
Kingfisher, Pied	*Ceryle rudis*					5,00	1
Kingfisher, Woodland	*Halcyon senegalensis*					25,00	5
Kite, Black-shouldered	*Elanus caeruleus*					5,00	1
Kite, Yellow-billed	*Milvus aegyptius*					15,00	3
Korhaan, Red-crested	*Lophotis ruficrista*				Near-endemic	65,00	13
Lapwing, Blacksmith	*Vanellus armatus*					65,00	13
Lapwing, Crowned	*Vanellus coronatus*					20,00	4
Lark, Monotonous	*Mirafra passerina*				Near-endemic	5,00	1
Lark, Rufous-naped	*Mirafra africana*					10,00	2
Lark, Sabota	*Calendulauda sabota*				Near-endemic	65,00	13

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Martin, Banded	*Riparia cincta*					5,00	1
Masked-weaver, Lesser	*Ploceus intermedius*					15,00	3
Masked-weaver, Southern	*Ploceus velatus*					70,00	14
Mousebird, Red-faced	*Urocolius indicus*					55,00	11
Myna, Common	*Acridotheres tristis*					5,00	1
Neddicky, Neddicky	*Cisticola fulvicapilla*					15,00	3
Nightjar, Fiery-necked	*Caprimulgus pectoralis*					15,00	3
Nightjar, Rufous-cheeked	*Caprimulgus rufigena*					25,00	5
Oriole, Black-headed	*Oriolus larvatus*					15,00	3
Owl, Barn	*Tyto alba*					10,00	2
Owlet, Pearl-spotted	*Glaucidium perlatum*					10,00	2
Oxpecker, Red-billed	*Buphagus erythrorynchus*					55,00	11
Painted-snipe, Greater	*Rostratula benghalensis*	LC	NT			30,00	6
Paradise-flycatcher, African	*Terpsiphone viridis*					10,00	2
Paradise-whydah, Long-tailed	*Vidua paradisaea*					25,00	5
Parrot, Meyer's	*Poicephalus meyeri*					5,00	1
Pigeon, Speckled	*Columba guinea*					15,00	3
Pipit, Buffy	*Anthus vaalensis*					5,00	1
Plover, Kittlitz's	*Charadrius pecuarius*					40,00	8
Plover, Three-banded	*Charadrius tricollaris*					45,00	9
Pratincole, Black-winged	*Glareola nordmanni*	NT	NT			10,00	2
Prinia, Black-chested	*Prinia flavicans*				Near-endemic	25,00	5
Prinia, Tawny-flanked	*Prinia subflava*					20,00	4
Puffback, Black-backed	*Dryoscopus cubla*					40,00	8
Pytilia, Green-winged	*Pytilia melba*					75,00	15
Quail, Harlequin	*Coturnix delegorguei*					5,00	1
Quailfinch, African	*Ortygospiza fuscocrissa*					5,00	1
Quelea, Red-billed	*Quelea quelea*					55,00	11
Robin-chat, Cape	*Cossypha caffra*					5,00	1
Roller, European	*Coracias garrulus*	LC	NT			15,00	3
Roller, Lilac-breasted	*Coracias caudatus*					70,00	14
Roller, Purple	*Coracias naevius*					45,00	9
Ruff	*Philomachus pugnax*					40,00	8
Sandgrouse, Burchell's	*Pterocles burchelli*				Near-endemic	40,00	8
Sandgrouse, Double-banded	*Pterocles bicinctus*				Near-endemic	20,00	4
Sandpiper, Common	*Actitis hypoleucos*					10,00	2
Sandpiper, Marsh	*Tringa stagnatilis*					5,00	1

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Sandpiper, Wood	*Tringa glareola*					45,00	9
Scimitarbill, Common	*Rhinopomastus cyanomelas*					25,00	5
Scops-owl, Southern White-faced	*Ptilopsis granti*					10,00	2
Scrub-robin, Kalahari	*Erythropygia paena*				Near-endemic	20,00	4
Scrub-robin, White-browed	*Erythropygia leucophrys*					65,00	13
Shrike, Crimson-breasted	*Laniarius atrococcineus*				Near-endemic	95,00	19
Shrike, Lesser Grey	*Lanius minor*					10,00	2
Shrike, Red-backed	*Lanius collurio*					55,00	11
Shrike, Southern White-crowned	*Eurocephalus anguitimens*				Near-endemic	30,00	6
Snake-eagle, Black-chested	*Circaetus pectoralis*					15,00	3
Snake-eagle, Brown	*Circaetus cinereus*					5,00	1
Sparrow, Cape	*Passer melanurus*				Near-endemic	15,00	3
Sparrow, Great	*Passer motitensis*				Near-endemic	45,00	9
Sparrow, House	*Passer domesticus*					15,00	3
Sparrow, Southern Grey-headed	*Passer diffusus*					90,00	18
Sparrow-weaver, White-browed	*Plocepasser mahali*					55,00	11
Spoonbill, African	*Platalea alba*					15,00	3
Spurfowl, Natal	*Pternistis natalensis*				Near-endemic	25,00	5
Spurfowl, Swainson's	*Pternistis swainsonii*					30,00	6
Starling, Burchell's	*Lamprotornis australis*				Near-endemic	30,00	6
Starling, Cape Glossy	*Lamprotornis nitens*					80,00	16
Starling, Greater Blue-eared	*Lamprotornis chalybaeus*					5,00	1
Starling, Meves's	*Lamprotornis mevesii*					10,00	2
Starling, Violet-backed	*Cinnyricinclus leucogaster*					40,00	8
Starling, Wattled	*Creatophora cinerea*					35,00	7
Stilt, Black-winged	*Himantopus himantopus*					25,00	5
Stint, Little	*Calidris minuta*					20,00	4
Stonechat, African	*Saxicola torquatus*					5,00	1
Stork, Abdim's	*Ciconia abdimii*	LC	NT			5,00	1
Stork, Marabou	*Leptoptilos crumeniferus*	LC	NT			30,00	6
Stork, Saddle-billed	*Ephippiorhynchus senegalensis*	LC	EN			10,00	2
Stork, White	*Ciconia ciconia*					5,00	1
Stork, Yellow-billed	*Mycteria ibis*	LC	EN			25,00	5
Sunbird, Marico	*Cinnyris mariquensis*					50,00	10
Sunbird, White-bellied	*Cinnyris talatala*					25,00	5
Swallow, Barn	*Hirundo rustica*					55,00	11
Swallow, Greater Striped	*Cecropis cucullata*					10,00	2

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Swallow, Lesser Striped	*Cecropis abyssinica*					5,00	1
Swallow, Red-breasted	*Cecropis semirufa*					60,00	12
Swallow, Wire-tailed	*Hirundo smithii*					5,00	1
Swift, Little	*Apus affinis*					15,00	3
Swift, White-rumped	*Apus caffer*					5,00	1
Tchagra, Black-crowned	*Tchagra senegalus*					10,00	2
Tchagra, Brown-crowned	*Tchagra australis*					65,00	13
Teal, Cape	*Anas capensis*					10,00	2
Teal, Red-billed	*Anas erythrorhyncha*					25,00	5
Tern, White-winged	*Chlidonias leucopterus*					10,00	2
Thick-knee, Spotted	*Burhinus capensis*					45,00	9
Thick-knee, Water	*Burhinus vermiculatus*					5,00	1
Thrush, Groundscraper	*Turdus litsitsirupa*					5,00	1
Thrush, Kurrichane	*Turdus libonyanus*					5,00	1
Tit, Ashy	*Parus cinerascens*				Near-endemic	20,00	4
Tit, Southern Black	*Parus niger*					25,00	5
Tit-babbler, Chestnut-vented	*Sylvia subcaerulea*				Near-endemic	60,00	12
Turtle-dove, Cape	*Streptopelia capicola*					80,00	16
Vulture, Lappet-faced	*Torgos tracheliotos*	EN	EN			15,00	3
Vulture, White-backed	*Gyps africanus*	CR	CR			60,00	12
Warbler, Garden	*Sylvia borin*					5,00	1
Warbler, Icterine	*Hippolais icterina*					15,00	3
Warbler, Olive-tree	*Hippolais olivetorum*					20,00	4
Warbler, Willow	*Phylloscopus trochilus*					25,00	5
Waxbill, Black-faced	*Estrilda erythronotos*					35,00	7
Waxbill, Blue	*Uraeginthus angolensis*					95,00	19
Waxbill, Common	*Estrilda astrild*					10,00	2
Waxbill, Violet-eared	*Uraeginthus granatinus*					65,00	13
Weaver, Village	*Ploceus cucullatus*					10,00	2
White-eye, Cape	*Zosterops virens*			Near endemic	Endemic	5,00	1
Whitethroat, Common	*Sylvia communis*					20,00	4
Whydah, Pin-tailed	*Vidua macroura*					5,00	1
Whydah, Shaft-tailed	*Vidua regia*				Near-endemic	30,00	6
Wood-dove, Emerald-spotted	*Turtur chalcospilos*					60,00	12
Wood-hoopoe, Green	*Phoeniculus purpureus*					25,00	5
Woodpecker, Bearded	*Dendropicos namaquus*					5,00	1
Woodpecker, Bennett's	*Campethera bennettii*					5,00	1

Family Name	Scientific Name	Red Data Global	Red Data Regional	Endemicity South Africa	Endemicity Southern Africa	Average Report Rate	No. of Records
Woodpecker, Cardinal	*Dendropicos fuscescens*					25,00	5
Woodpecker, Golden-tailed	*Campethera abingoni*					10,00	2
Wren-warbler, Barred	*Calamonastes fasciolatus*				Near-endemic	30,00	6

APPENDIX 3: METHOD OF ASSESSING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the development of the proposed railway crossing loop extensions. The process of assessing the impacts of the project encompasses the following four activities:

* Identification and assessment of potential impacts
* Prediction of the nature, magnitude, extent and duration of potentially significant impacts
* Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity
* Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact.

In accordance with GNR 543, promulgated in terms of section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), specialists will be required to assess the significance of potential impacts in terms of the following criteria:

* Cumulative impacts
* Nature of the impact
* Extent of the impact
* Intensity of the impact
* Duration of the impact
* Probability of the impact occurring
* Impact non-reversibility
* Impact on irreplaceable resources
* Confidence level

Issues are assessed in terms of the following criteria:

* The nature, a description of what causes the effect, what will be affected and how it will be affected

* The physical extent, wherein it is indicated whether:

    1 - the impact will be limited to the site
    2 - the impact will be limited to the local area
    3 - the impact will be limited to the region
    4 - the impact will be national
    5 - the impact will be international

* The duration, wherein it is indicated whether the lifetime of the impact will be:

    1 - of a very short duration (0–1 years)
    2 - of a short duration (2-5 years)
    3 - medium-term (5–15 years)
    4 - long term (> 15 years)
    5 – permanent

- The magnitude of impact on ecological processes, quantified on a scale from 0-10, where a score is assigned:

  0 - small and will have no effect on the environment
  2 - minor and will not result in an impact on processes
  4 - low and will cause a slight impact on processes
  6 - moderate and will result in processes continuing but in a modified way
  8 - high (processes are altered to the extent that they temporarily cease)
  10 - very high and results in complete destruction of patterns and permanent cessation of processes

- The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:

  1 - very improbable (probably will not happen
  2 - improbable (some possibility, but low likelihood)
  3 - probable (distinct possibility)
  4 - highly probable (most likely)
  5 - definite (impact will occur regardless of any prevention measures)

- The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.

- The status, which is described as either positive, negative or neutral.

- The degree to which the impact can be reversed.

- The degree to which the impact may cause irreplaceable loss of resources.

- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

S = (E + D + M) * P

The significance weightings for each potential impact are as follows:

< 30 points: LOW (i.e. where this impact would not have a direct influence on the decision to develop in the area);

30-60 points: MEDIUM (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);

> 60 points: HIGH (i.e. where the impact must have an influence on the decision process to develop in the area).

APPENDIX 4: CURRICULUM VITAE

MEGAN DIAMOND

PERSONAL DETAILS

Date of Birth | ***7 December 1978***

Driver's License | ***Code A and B***

Home Language | ***English***

Other Languages | ***Afrikaans***

EDUCATION

BSc Environmental Management | *University of South Africa (UNISA)* 2002 – 2009

ACCREDITATION

South African Council for Natural Scientific Professions | *Environmental Science*

Registration Number: 300022/14

EXPERIENCE

Owner & Avifaunal Specialist | *Feathers Environmental Services*

July 2013 – Present

* Perform specialist avifaunal assessment studies to minimise the impact of industrial infrastructure on birds and their habitats;
* Provide strategic guidance to industry through the development of best practice procedures and guidelines;
* Review and comment on methodologies, specialist studies and EIA reports for Renewable Energy projects;
* Provide input into renewable energy and power line developments elsewhere in Africa and across the globe;
* Manage the collection and collation of relevant and complete desktop and/or field datasets;
* Manage pre- and post-construction avifaunal monitoring data collected at wind and solar energy facilities;
* Site assessments, either as part of the project team or independently;
* Preparation of reports according to project deadlines, including the use of Geographic Information Systems (GIS) to portray data;
* Attendance of specialist integration meetings; and
* Liaison with stakeholders where necessary.

Wildlife & Energy Programme Manager | *Endangered Wildlife Trust*

October 2006 – June 2013

Programme management

- Annually review the programme's conservation and research strategic objectives and update in accordance with the EWT's and programme's vision and mission including work plans for staff etc.;
- Ensure timeous, professional delivery on all aspects of Wildlife & Energy Programme activities;
- Formulate, prioritise and approve relevant research and conservation projects;
- Ensure acceptable quality of all research projects and their outputs;
- Participate in international network liaison as and when required;
- Produce regular popular articles & media releases on the Wildlife & Energy Programme projects and outputs & contribute to the EWT publications;
- Establish & maintain a network with relevant national & international stakeholders;
- Deliver presentations at relevant meetings, functions, workshops & conferences on behalf of the programme;
- Assist with compilation of newsletters, updating of webpage, compilation of press articles, any advocacy issues;
- Identify & establish partnerships to achieve Wildlife & Energy Programme conservation goals.

Eskom –EWT Strategic Partnership

- Ensure that this partnership is managed effectively and sustainably against its goals. Manage staff in this division;
- Develop and maintain relationships with Eskom;
- Negotiate the terms of reference for the annual service level agreements between EWT and Eskom, to ensure the sustainability of the relationship;
- Compile annual report to Eskom Corporate Environment and Sustainability;
- Produce monthly reports to Eskom's regional grids on the status of incident follow-up;
- Attend applicable forums to interact with Eskom stakeholders;
- Participate in international network liaison as and when required;
- Maintain a network with all relevant local and regional level stakeholders (meetings, forums, workshops, etc.);
- Identify research needs relating to the management of wildlife interaction with power lines;
- Conduct research projects on wildlife and power line interaction and present the results at national and international conferences and workshops;
- Development and implementation of training for Eskom field services staff (at various levels) in the management of wildlife interactions; and
- Conduct special investigations on power lines relating to wildlife induced faulting.

Environmental Impact Assessment Division

- Ensure that this division operates effectively and efficiently at all times and manage staff in this division; and
- Conduct specialist avifaunal studies for new power lines developments including: tendering/quoting for the projects, conducting field work, preparing reports, presenting results & negotiating the acceptance of recommendations, final "walk through" as part of Environmental Management Plans; general project management, all liaison with clients, Eskom, authorities, Interested and Affected Parties etc.

Management and administration

- Ensure all programme staff have relevant terms of reference;
- Ensure that all programme staff are performance appraised against their terms of reference;
- Compile and manage programme budgets, monthly reports, work plans and strategy;
- Monitor expenditure and take corrective action if necessary; and
- Ensure timely delivery on all projects to all stakeholders.

CONFERENCE ATTENDANCE

- *Society for Conservation Biology 21st Annual Meeting (1-5 July 2007)*
- *The 6th TAWIRI Scientific Conference (3 – 6 December 2007) **Presented a paper titled "***Co-operative management of wildlife and power line conflicts: an African solution"
- Pan-African Ornithological Congress (7-12 September 2008)
- International Conference on Overhead Lines, Design, Construction, Inspection & Maintenance, Fort Collins Colorado USA. (29 March – 1 April 2010) Presented a paper titled "Bird's eye view: how birds see is key to avoiding power line collision"
- Windaba 2011 – Implementing South African Wind Energy (27-29 September 2011)
- Pan African Vulture Summit (16-20 April 2012) Presented a paper titled "Electrification in Africa – Are our vultures being strung along"
- 4th Wind Power Africa Conference & Renewable Energy Exhibition (28-30 May 2012) Presented a paper titled "Wind Energy in Africa – what does this really mean for our continent's birds"
- 13th Pan-African Ornithological Congress (14-21 October 2012) Presented a paper titled "Stringing South Africa's Terrestrial Birds Along - Monitoring of Bird Interactions with Power Line and Experimental Testing of Bird Collision Mitigation at the Karoo Long Term Monitoring Site"
- AEWA Single Species Action-Planning Workshop for the Conservation of the Grey Crowned Crane (10-13 September 2013) Presented and participated in the workshop as a subject expert (energy and bird interactions)

AUTHORED & CO-AUTHORED PAPERS

Jenkins, A.R., Smallie, J. & **Diamond, M.** 2009. Balls, flashers, flappers and coils: South African perspectives on a global search for ways to prevent avian collisions with overhead lines. In: Harebottle, D.M., Craig, A.J.F.K., Anderson, M.D., Rakatomonana, H. & Muchai, M. (eds). Proceedings of the 12th Pan-African Ornithological Congress, 2008. Cape Town, Animal Demography Unit.

Smallie, J., **Diamond, M**. & Jenkins, A. 2009. Lighting up the African continent – what does it mean for our birds? pp. 38–43. In: Harebottle, D.M., Craig, A.J.F.K., Anderson, M.D., Rakotomanana, H. & Muchai. (eds). *Proceedings of the 12th Pan-African Ornithological Congress, 2008.* Cape Town, Animal Demography Unit.

Jenkins, A. R., Smallie, J.J and **Diamond, M.** 2010 Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International, page1 of16.

Retief, E.F., **Diamond, M**., Anderson, M.D., Smit, H.A., Jenkins, A.R., Brooks, M. 2011. Avian Wind Farm Sensitivity Map for South Africa.

Jenkins, A.R., Van Rooyen, C.S., Smallie, J.J., Harrison, J.A., **Diamond, M**. And Smit, H.A. 2012. BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.

Jenkins, A.R., De Goede, K.H., Sebele, L. and **Diamond, M**. 2013. Brokering a settlement between eagles and
industry: sustainable management of large raptors nesting on power infrastructure. Bird Conservation International (2013) 23:232 – 246.

Diamond, M., Harris, J., Mirande, C. and Austin, J. 2014. People of a feather flock together: A global initiative to address crane and power line interactions. 13th North American Crane Workshop Summary. Lafayette, Louisiana.

Page-Nicholson, S., Tate, G., Hoogstad, C., Murison, M., **Diamond, M.**, Blofield, A., Pretorius, M., Michael, M.D. 2018. Mitigating the Impact of Large Mammals on Wooden Electrical Distribution Poles in the Kruger National Park, South Africa. African Journal of Wildlife Research.

Diamond, M. and Hoogstad, C. (in press) Collisions and habitat loss associated with utility lines and wind turbines. IUCN SSC Crane Specialist Group – Crane Conservation Strategy.