FLORAL, FAUNAL, WETLAND AND AQUATIC ECOLOGICAL ASSESSMENT AS PART OF THE ENVIRONMENTAL ASSESSMENT AND AUTHORISATION PROCESS FOR A PROPOSED CONSTRUCTION OF A FERROCHROME SMELTER NEAR NORTHAM, LIMPOPO PROVINCE

Prepared for

SLR Consulting (Africa) (Pty) Ltd.

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SECTION C – Faunal Assessment

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct a faunal, floral, wetland and aquatic ecological assessment as part of the environmental assessment and authorisation process for the proposed construction of a new ferrochrome (FeCr) Smelter located immediately adjacent to the existing Union Section Mine on Portion 3 of the farm Grootkuil 409 KQ, in the Thabazimbi Local Municipality, Limpopo Province. The proposed Siyanda ferrochrome smelter (hereafter referred to as the 'Project Infrastructure Area'), which will in broad terms comprise a railway siding, a raw materials offloading area, two 70 MW DC furnaces, crushing and screening plant, slag dump and baghouse slurry dam, as well as related facilities such as material stockpiles, workshops, stores and various support infrastructure and services, is located within the western portion of Portion 3 of the farm Grootkuil 409 KQ. In addition, an overhead powerline as well as one access road is proposed, with two access road alternatives, namely Access Road Corridor Option 2 and Access Road Option 3, being considered for development. The proposed powerline will originate from the Spitzkop substation to the southeast of Portion 3 of the farm Grootkuil 409 KQ, run north towards the southeastern corner of Portion 3 of the farm Grootkuil 409 KQ and from there extend along the southern boundary of the property towards the Project Infrastructure Area. The proposed Project Infrastructure Area, together with the proposed powerline and the two access road alternatives, of which only one will be developed, are hereafter referred to as the 'project site' (Figures 1 & 2). As part of the ecological assessment, the remainder of Portion 3 of the farm Grootkuil 409 KQ was also assessed, and, together with the project site, is hereafter referred to as the 'study area'.

The Project Infrastructure Area is situated approximately 10km to the west of the R510 regional road and 8km to the northwest of the town of Northam, and approximately 1,5km to the south of the Brits Road. The Swartklip Mine Village (developed as part of the Union Section Mine) is located immediately to the southwest of the Project Infrastructure Area.

2 METHOD OF ASSESSMENT

2.1 Desktop Study

Initially a desktop study was undertaken to gather background information regarding the Project Site, the remainder of Portion 3 of the farm Grootkuil 409 KQ and its surrounding areas. Relevant authorities were consulted regarding conservational species lists, and all the latest available literature was utilised to gain a thorough understanding of the area and its surrounding habitats. This information was then used to determine the potential biodiversity lists, an expected list of Red Data Listed (RDL) and other faunal Species of Conservation Concern (SCC) and to compile the anticipated SCC Sensitivity Index Score (SCCSIS) list of faunal species for the study area. This information incorporated (amongst others) data on vegetation types, habitat suitability and biodiversity potential coupled to this information.

2.2 Literature Review

Faunal SCC which have been recorded in the Limpopo Province as per the Limpopo State of the Environment Report (Limpopo SoER, 2004) for the Limpopo Department of Finance and Economic Development (LDFED, 2004), are listed in Appendices A - E. This information was cross-referenced with information from the International Union for the Conservation of Nature (IUCN) Red Data list for 2015 (http://www.iucnredlist.org). The occurrence and potential occurrence of faunal RDL species within the study area as listed to occur in the Limpopo Province (LDFED, 2004) were specifically focused on and addressed in the result section in this report.

2.3 Field Assessment

The presence of any faunal inhabitants within the study area was assessed through direct visual observation or identifying such species through calls, tracks, scats, burrows and other methods as described in the sections below.

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the field assessment. In addition, the levels of anthropogenic activity within the study area and surrounding area may influence the diversity and abundance of faunal species observed.

The faunal categories covered in this assessment are mammals, avifauna, reptiles, amphibians, invertebrates, arachnida.

2.3.1 Mammals

Small mammals are unlikely to be directly observed in the field because of their nocturnal/crepuscular and cryptic nature. A simple and effective solution to this problem is to use Sherman traps. A Sherman trap is a small aluminium box with a spring-loaded door (Figure 1). Once the animal is inside the trap, it steps on a small plate that causes the door to snap shut, thereby capturing the individual. In the event of capturing a small mammal during the night, the animal would be photographed and then set free unharmed early the following morning. Traps were baited with a universal mixture of oats, peanut butter, and fish paste.

Figure 1: Sherman trap and bait used to capture and identify small mammal species.

Field camera traps were used to document medium to large mammal species (Figure 2). These cameras were placed along trails and near suitable habitat areas, including riparian areas, and left in position for the full duration of the field assessments.

Figure 2: Field cameras used to document medium to large mammal species.

Medium to large mammal species were further recorded during the field assessment with the use of visual identification, and the identification of spoor, call and dung.

2.3.2 Avifauna

The Southern African Bird Atlas Project 2 (SABAP2) database (http://sabap2.adu.org.za/) lists for the Quarter Degree Square (QDS) 2427CC (Appendix F) was compared with the recent field survey of avifaunal species identified on the study area. Field surveys were undertaken utilising a pair of binoculars and bird call identification techniques were utilised during the assessment in order to accurately identify avifaunal species. Specific attention was given to the identification of RDL avifaunal species as listed in the Limpopo SoER (LDFED, 2004) as well as avifaunal species listed as being of conservation concern by the IUCN (2015).

2.3.3 Reptiles

Reptiles were physically identified during the field survey. Rocks in the study area were overturned and inspected and any reptiles encountered were identified. Other habitat areas where reptiles were likely to reside were also investigated. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the study area. Specific attention was given to RDL reptile species listed in the Limpopo SoER (LDFED, 2004) as well as reptile species listed as being of conservation concern by the IUCN (2015).

2.3.4 Amphibians

Identifying amphibian species is done by the use of direct visual identification along with call identification technique. Amphibian species flourish in and around wetland and riparian areas. It is in these areas that specific attention was paid to when searching for amphibian species. However, it is unlikely that all amphibian species will have been recorded during the field assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the study area as well as the surrounding area. Specific attention was given to RDL amphibian species listed in the Limpopo SoER (LDFED, 2004) as well as amphibian species listed as being of conservation concern by the IUCN (2015).

2.3.5 Invertebrates

A list of visually identified and observed general invertebrate species was compiled during the field survey. However, due to their cryptic nature and habits, varied stages of life cycles, seasonal and temporal fluctuations within the environment, it is unlikely that all invertebrate species will have been recorded during the field assessment periods. Nevertheless, the data gathered during the general invertebrate assessment along with the habitat analysis provided an accurate indication of which invertebrate species are likely to occur on the study area at the time of survey. Specific attention was given to RDL invertebrate species listed in the Limpopo SoER (LDFED, 2004) as well as invertebrate species listed as being of conservation concern by the IUCN (2015).

2.3.6 Arachnida

Suitable undisturbed habitats such as more rocky areas, where encountered, where spiders and scorpions are likely to reside, were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for *Mygalomorphae* arachnids (Trapdoor and Baboon spiders) as well as potential scorpion SCC within the study area.

2.4 Species of Conservation Concern Assessment

2.4.1 Species of Conservation Concern Sensitivity Index

The term SCC in the context of this report refers to all international (IUCN) and national RDL faunal species, as well as protected species of relevance to the project. The lists below are all

specified in legislation except for IUCN, which is the oldest and largest global environmental organisation. It should be noted that some species or families considered threatened on a national level may not be considered threatened on a provincial level due to various factors such as stable local population trends; for these species provincial status took precedence.

The following legislation and international listings were used during the SCC consideration:

I. **Provincial conservation:** protected species listed in the Limpopo Environmental Management Act (LEMA; Act 7 of 2003) and the Limpopo SoER (LDFED, 2004);
II. **National conservation:** National Environmental Management Act (NEMA; Act 107 of 1998) and National Environmental Management: Biodiversity Act (NEMBA; Act 10 of 2004) ; and
III. **Global conservation:** protected species under the IUCN. Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) Least Concern (LC), and Data deficient (DD) categories of ecological status.

Given the restrictions of field assessments to identify all the faunal species that possibly occur on a particular property, the SCCSIS has been developed to provide an indication of the potential faunal SCC that could reside in the area, while simultaneously providing a quantitative measure of the study area's value in terms of conserving faunal diversity. The SCCSIS is based on the principles that when the knowledge of a species' historical distribution is combined with a field assessment that identifies the degree to which the property supports a species' habitat and food requirements, interpretations can be made about the probability of that particular species residing within the study area. Repeating this procedure for all the potential faunal SCC of the area and collating this information then provides a sensitivity measure of the property that has been investigated. The detailed methodology to determine the SCCSIS of the study area is presented below:

Probability of Occurrence (POC): Known distribution range (D), habitat suitability of the site (H) and availability of food sources (F) on site were determined for each of the species. Each of these variables is expressed a percentage (where 100% is a perfect score). The average of these scores provided a POC score for each species. The POC value was categorised as follows:

- **0-20% = Low;**
- **21-40% = Low to Medium;**
- **41-60% = Medium;**
- **61-80% = Medium to High and**
- **81-100% = High**

POC = (D+H+F)/3

Total Species Score (TSS): Species with POC of more than 60% (High-medium) were considered when applying the SCCSIS. A weighting factor was assigned to the different IUCN categories providing species with a higher conservation status, a higher score. This weighting factor was then multiplied with the POC to calculate the TSS for each species. The weighting as assigned to the various categories is as follows:

- **Data Deficient = 0.2;**
- **Rare = 0.5;**
- **Near Threatened = 0.7;**
- **Vulnerable = 1.2;**
- **Endangered = 1.7 and**
- **Critically Endangered = 2.0.**

TSS = (IUCN weighting*POC) where POC > 60%

Average Total Species (Ave TSS) and Threatened Taxa Score (Ave TT): The average of all TSS potentially occurring on the site is calculated. The average of all the Threatened taxa (TT) (Near threatened, Vulnerable, Endangered and Critically Endangered) TSS scores are also calculated. The average of these two scores (Ave TSS and Ave TT) was then calculated in order to add more weight to threatened taxa with POC higher than 60%.

Ave = Ave TSS [TSS/No of Spp] + Ave TT [TT TSS/No of Spp]/2

SCCSIS: The average score obtained above and the sum of the percentage of species with a POC of 60% or higher of the total number of SCC listed for the area was then calculated. The average of these two scores, expressed as a percentage, gives the SCCSIS for the area investigated.

SCCSIS = Ave + [Spp with POC>60%/Total no Of Spp*100]/2

SCCSIS interpretation:

Table 1: SCCSIS value interpretation with regards to faunal SCC importance on the study area.

SCCSIS Score	SCC importance
0-20%	Low
21-40%	Low-Medium
41-60%	Medium
60-80%	High-Medium

81-100%	**High**

3 RESULTS OF THE FAUNAL ASSESSMENT

The vegetation type applicable to the study area is the Dwaalboom Thornveld vegetation type (Mucina & Rutherford, 2006). The faunal habitat units throughout the study area comprise of the Wetland/ Riparian Habitat Unit, the Bushveld Habitat Unit and the Transformed Habitat Unit. The surrounding area is currently used for mining, subsistence livestock farming, game farming and includes several homestead dwellings where subsistence crop farming activities are taking place. The Wetland/ Riparian Habitat Unit was dry during both field assessment periods.

3.1 Mammals

Mammal species recorded throughout the study area during the April and August 2015 field surveys are listed in Table 2 below.

Table 2: Mammal species recorded during the field surveys as well as their 2015 IUCN status.

Scientific Name	Common Name	IUCN 2015 Status
Galerella sanguinea	Slender Mongoose	LC
Phacochoerus aethiopicus	Warthog	LC
Hystrix africaeaustralis	Cape Porcupine	LC
Raphicerus campestris	Steenbuck	LC
Redunca arundinum	Reedbuck	LC
Tragelaphus strepsiceros	Kudu	LC
Lupus saxatilis	Scrub Hare	LC
Aethomys chrysophilus	Red Veld Rat	LC
Herpestes sanguineus	Slender Mongoose	LC
Canis mesomelas	Blacked –backed Jackal	LC

LC = Least Concern

All the above listed species were observed either directly, by spoor, territorial markings or through the use of motion sensitive camera traps or sherman traps placed throughout the study area. Field signs of *Phacochoerus aethiopicus* (Warthog) were present in the Wetland/ Riparian Habitat Unit and *Redunca arundinum* (Reedbuck) was observed several times during the field assessment. *Herpestes sanguineus* (Slender Mongoose) and scats indicating the presence of other small omnivorous predators were noted within the study area. *Canis mesomelas* (Black-backed Jackal) was also observed using camera traps during the survey, with spoor of domestic dog also noted within the study area (Figure 3). Although portions of the study area have been transformed by cattle farming and maize cultivation, the Wetland/ Riparian Habitat Unit and Bushveld Habitat Unit present on the study area still provide sufficiently intact habitat for many mammal species. The Wetland/ Riparian Habitat Unit was also the habitat unit where nearly all of the mammal species were encountered.

Baited Sherman traps were utilised to capture small mammals which may inhabit the study area. Traps were placed in areas where suitable small mammal habitat was observed. Five *Aethomys chrysophilus* (Red Veld Rat) were successfully captured in three different locations close to Wetland/ Riparian Habitat Units.

Camera traps were utilised to capture photos of any animal activities in the study area and also increased the observation time of fieldwork. Traps were placed in areas where mammal activities were observed. *Canis mesomelas* (Blacked-backed Jackal) and *Redunca arundinum*

(Reedbuck) were observed using camera traps. A total of 99 hours of additional continuous field observation was made possible with the use of camera traps (Table 3).

Figure 3: *Redunca arundinum* (Reedbuck) on the top left, *Phacochoerus aethiopicus* (Warthog) dung on the top right, Male *Redunca arundinum* (Reedbuck) observed using camera trap and *Canis mesomelas* (Blacked –backed Jackal) observed using a camera trap.

Table 3: Hours Camera traps was used in the field during the field assessment

Camera trap Site	Hours in Field
1	51
2	48
Total Hours	99

In terms of conservation, no mammal SCC was encountered during the field assessment. The likelihood of any mammal SCC as listed in Appendix A being encountered is considered to be low due to the anthropogenic activities and agricultural activity that is currently taking place throughout the study area and surrounding areas.

The proposed location of the Project Site have been placed in such a way as to minimise the loss of mammal habitat. The smelter infrastructure is placed on a cultivated land, outside of more intact habitat areas and is therefore unlikely to significantly impact on mammal SCC

habitat, while the proposed powerline alignment and access road alternatives are also located within areas that are already mostly disturbed.

3.2 Avifauna

Surveys were conducted across the entire study area and in the immediate surroundings with assessments undertaken during April 2015 (autumn/ late summer) and August 2015 (Late winter), however it must be noted that some migratory birds may not have been identified due to seasonal migration patterns. Avifaunal species breeding periods differ seasonally and as such some breeding species may not have been observed during the field visits.

Table 4 lists all the avifaunal species observed during the field assessment within the study area. The majority of avifaunal species observed was common species, with Table 5 listing avifaunal SCC that were also observed within the boundaries of the study area. Both the Bushveld and Wetland/Riparian Habitat Units provide consistent habitat for a number of common avifaunal species, with the Transformed Habitat Unit being subject to change due to varying degrees of usage through agricultural activities. The Wetland/ Riparian Habitat Unit had a higher diversity and number of common avifaunal species, which utilise these areas for breeding and foraging. The complete list of avifaunal SCC occurring within the Limpopo Province is included in Appendix B (LDFED, 2004).

Table 4: Avifaunal species recorded during the survey, with threatened species indicated in bold.

Scientific Name	Common Name	IUCN status 2015
Tricholaema leucomelas	Acacia Pied Barbet	LC
Anhinga rufa	African Darter	LC
Haliaeetus vocifer	African Fish Eagle	LC
Tockus nasutus	African Grey Hornbill	LC
Aquila spilogaster	African Hawk Eagle	LC
Upupa africana	African Hoopoe	LC
Cypsiurus parvus	African Palm Swift	LC
Anthus cinnamomeus	African Pipit	NYBA
Acrocephalus baeticatus	African Reed Warbler	NYBA
Gallinago nigripennis	African Snipe	LC
Saxicola torquatus	African Stone Chat	LC
Vanellus senegallus	African Wattled Lapwing	LC
Falco amurensis	Amur Falcon	LC
Turdoides jardineii	Arrow-marked Babbler	LC
Parus cinerascens	Ashy Tit	LC
Apalis thoracica	Bar-throated Apalis	LC
Prinia flavicans	Black-chested Prinia	LC
Circaetus pectoralis	Black-chested Snake Eagle	LC

Scientific Name	Common Name	IUCN status 2015
Estrilda erythronotos	Black-faced Waxbill	LC
Ardea melanocephala	Black-headed Heron	LC
Elanus caeruleus	Black-shouldered Kite	LC
Vanellus armatus	Blacksmith Lapwing	LC
Crithagra atrogularis	Black-throated Canary	LC
Uraeginthus angolensis	Blue waxbill	LC
Rhinoptilus chalcopterus	Bronze-winged Courser	LC
Tchagra australis	Brown-crowned Tchagra	LC
Nilaus afer	Brubru	LC
Centropus burchellii	Burchell's Coucal	LC
Lamprotornis australis	Burchell's Starling	LC
Eremomela utricollis	Burn-necked Eremomela	LC
Lamprotornis nitens	Cape Glossy Starling	LC
Cossypha caffra	Cape Robin-Chat	LC
Passer melanurus	Cape Sparrow	LC
Streptopelia capicola	Cape Turtle Dove	LC
Batis molitor	Chinspot Batis	LC
Sylvia subcaerulea	Chestnut-vented Tit-babbler	LC
Buteo buteo	Common Buzzard	LC
Lanius collaris	Common Fiscal	LC
Delihon urbicum	Common House Martin	LC
Charadrius hiaticula	Common Ringed Plover	LC
Rhinopomastus cyanomelas	Common Scimitarbill	LC
Trachyphonus vaillantii	Crested Barbet	LC
Dendroperdix sephaena	Crested Francolin	LC
Laniarius atrococcineus	Crimson-breasted Shrike	LC
Vanellus coronatus	Crowned Lapwing	LC
Pycnonotus tricolor	Dark-capped Bulbul	LC
Cisticola aridulus	Desert Cisticola	LC
Coracias garrulus	**European Roller**	**NT**
Dicrurus adsimilis	Fork-tailed Drongo	LC
Melierax gabar	Gabar Goshawk	LC
Passer motitensis	Great Sparrow	LC
Indicator indicator	Greater Honeyguide	LC
Pytilia melba	Green-winged Pytilia	LC
Corythaixoides concolor	Grey Go-away-bird	LC
Bostrychia hagedash	Hadeda Ibis	LC
Scopus umbretta	Hamerkop	LC
Numida meleagris	Helmeted Guineafowl	LC
Passer domesticus	House Sparrow	LC
Erythropygia paena	Kalahari Scrub Robin	LC
Streptopelia senegalensis	Laughing Dove	LC
Lanius minor	Lesser Grey Shrike	LC
Coracias caudatus	Lilac-breasted Roller	LC
Apus affinis	Little Swift	LC
Sylvietta rufescens	Long-billed crombec	LC
Urolestes melanoleucus	Magpie Shrike	LC

Scientific Name	Common Name	IUCN status 2015
Alcedo cristata	Malachite Kingfisher	LC
Polemaetus bellicosus	**Martial Eagle**	**VU**
Oena capensis	Namaqua Dove	LC
Cisticola fulvicapilla	Neddicky	LC
Glaucidium perlatum	Pearl-spotted Owlet	LC
Corvus albus	Pied crow	LC
Ceryle rudis	Pied Kingfisher	LC
Vidua macroura	Pin-tailed Whydah	LC
Lanius collurio	Red-backed Shrike	LC
Quelea quelea	Red-billed Quelea	LC
Bubalornis niger	Red-billed Buffalo Weaver	LC
Cuculus solitarius	Red-chested Cuckoo	LC
Lophotis ruficrista	Red-crested Korhaan	LC
Streptopelia semitorquata	Red-eyed Dove	LC
Columba livia	Rock Dove	LC
Calendulauda sabota	Sabota Lark	LC
Tockus rufirostris	Southern Red red-billed Hornbill	LC
Eurocephalus anguitimens	Southern White-crowned Shrike	LC
Colius striatus	Speckled Mousebird	LC
Bubo africanus	Spotted Eagle-Owl	LC
Burhinus capensis	Spotted Thick-knee	LC
Plectropterus gambensis	Spur-winged Goose	LC
Pternistis swainsonii	Swainson's Spurfowl	LC
Charadrius tricollaris	Three-banded Plover	LC
Uraeginthus granatinus	Violet-eared Waxbill	LC
Creatophora cinerea	Wattled Starling	LC
Tyto alba	Western Barn Owl	LC
Bubulcus ibis	Western Cattle Egret	LC
Plocepasser mahali	White-browed Sparrow-Weaver	LC
Merops bullockoides	White-fronted Bee-eater	LC
Euplectes albonotatus	White-winged Widowbird	LC
Pterocles gutturalis	**Yellow-throated Sandgrouse[1]**	**LC**

LC = Least Concern, NYBA = Not Yet Been Assessed, NT = Near Threatened, VU = Vulnerable

Table 5: Avifaunal SCC recorded during the field assessment.

Scientific Name	Common Name	IUCN status	Limpopo SoER, 2004 Status
Coracias garrulus	European Roller	NT	
Polemaetus bellicosus	Martial Eagle	VU	T
Pterocles gutturalis	**Yellow-throated Sandgrouse**	**LC**	

NT = Near Threatened, VU = Vulnerable, T = Listed as threatened but with no specific status for the Limpopo Province

[1] Although *Pterocles gutturalis* is listed as LC globally, it is considered to be NT on a regional scale.

Figure 4: *Aquila spilogaster* (African Hawk Eagle) on the left and *Tyto alba* (Western Barn Owl) on the right observed during the field assessment.

The figures above show *Aquila spilogaster* (African Hawk Eagle) hunting *Numida meleagris* (Helmeted Guineafowl) in the Wetland/ Riparian Habitat Unit adjacent to the cultivated land in the study area. *Tyto alba* (Western Barn Owl) was spotted utilising a *Vachellia erioloba* (Camel Thorn) with a hole in the trunk of the tree to make a nest. Four chicks were present in the nest, with several pellets with rodent fur and bones noted.

According to Birdlife South Africa (BLSA), the study area borders the Northern Turf Thornveld Important Bird Area (IBA) (Figure 5), which has been highlighted as an important conservation area within South Africa (Birdlife South Africa, 2015) but is currently not protected. The IBA was established because a number of avifaunal SCC are known to occur within the area and also utilise the area for breeding. *Pterocles gutturalis* (Yellow-throated Sandgrouse) utilise the IBA area and is one of the core remaining resident South African populations for this species. The population of *Pterocles gutturalis* is relatively healthy, and have adapted to foraging fallow fields as most of the natural habitat has been transformed by agricultural activities. Increasing mine footprint areas are also of concern, especially considering the number of mines in the area. Other important birds also occurring in this IBA are *Falco biarmicus* (Lanner Falcon), *Glareola nordmanni* (Black-winged Pratincole), *Ardeotis kori* (Kori Bustard) and *Sagittarius serpentarius* (Secretary bird).

Polemaetus bellicosus (Martial Eagle), *Pteocles gutturalis* (Yellow-throated Sandgrouse) and *Coracias garrulous* (European Roller), listed as SCC on a national- and/or international level, were present in the study area during the field assessment.

The smelter infrastructure, powerline alignment and access road alternatives have been positioned in such a way as to minimise overall ecological impacts by placing these

infrastructure components within cultivated, transformed land. However, from an avifaunal perspective, the cultivated lands form the preferred habitat for two avifaunal SCC, namely *Pteocles gutturalis* (Yellow-throated Sandgrouse) and *Polemaetus bellicosus* (Martial Eagle). In order to ensure sustained habitat for these two species, it is recommended that existing cultivated lands to the east of the proposed smelter infrastructure remain under cultivation. If this is not feasible, existing cultivated fields in the surrounding region beyond the study area is expected to still support these species. The proposed project therefore will not lead to overall loss of habitat in the region, but may limit the occurrence of these species within the study area itself and these species will have to move into adjacent territories and an increase of competition for food may occur.

Vultures were observed on an adjacent property to the west of the study area, most likely *Gyps africanus* (White-backed vulture). It is strongly recommended that bird flappers are used to reduce the amount of bird collisions with the proposed power line.

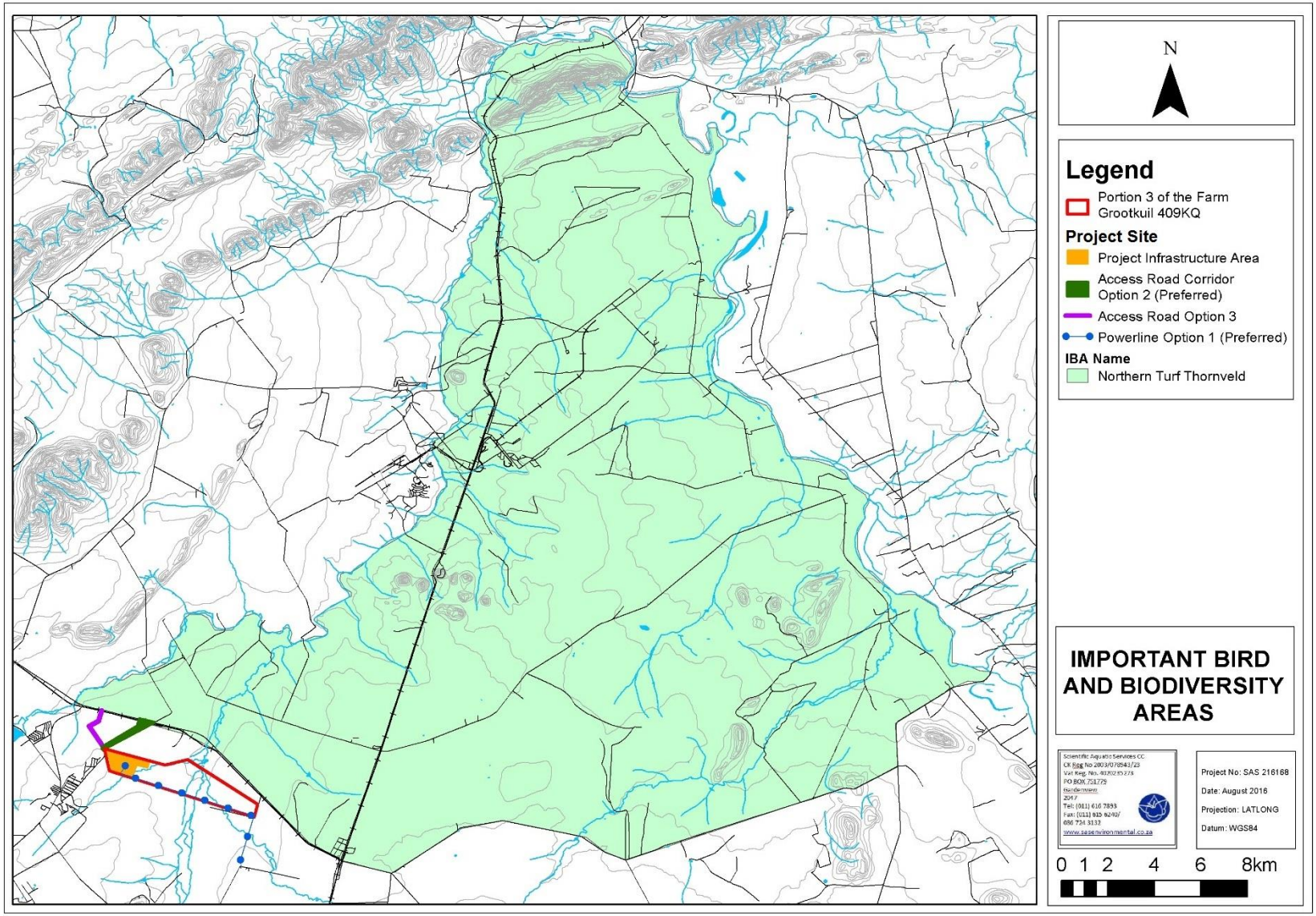

Figure 5: The Northern Turf Thornveld IBA located to the north of the study area.

3.3 Amphibians

No common amphibian species or amphibian SCC were encountered during the field assessment. This was potentially due to the limited suitable habitat in the form of perennial water sources for amphibian species.

Common species that are expected to occur in this region include *Ptychadena anchietae* (Plain Grass Frog)*, Amietophrynus gutteralis* (Guttural Toad) and *Schismaderma carens* (Red Toad).

Although none were found, there remains the possibility that *Pyxicephalus adspersus* (Giant Bullfrog) may occur within the Wetland/ Riparian Habitat Unit. *P. adspersus* is listed by the IUCN as being of Least Concern, but on a provincial basis this species is listed as Vulnerable by the LEMA (Act 7 of 2003) under Schedule 3 (Protected Wild Animals). Consideration needs to be given to *P. adspersus* (Giant Bullfrog), as this species remains buried within the soil up to 1m deep in sandy soils (preferred substrate) and 300mm deep in clay substrates (Du Preez and Carruthers, 2009) for the majority of the year, emerging during periods of high rainfall to breed. In the study area, a number of small depressions and dams, as well as larger drainage lines with riparian vegetation were present, where *P. adspersus* may be found. The complete list of amphibian SCC known to occur within the Limpopo Province is included in Appendix C (LDFED, 2004).

The Wetland/ Riparian Habitat Unit and associated buffer areas in the study area must be protected to prevent any habitat loss of any potential amphibian SCC such as *P. adspersus* which may occur within this habitat unit. The smelter infrastructure, powerline alignment and access road alternatives have however been positioned in such a way as to minimise the impact on amphibian habitat, with the smelter infrastructure placed on existing cultivated land and stream crossings being limited to existing crossings. The proposed development will therefore not pose a significant threat to amphibian SCC habitat.

3.4 Reptiles

Trachylepis punctatissima (Montane Striped Skink), *Stigmochelys pardalis* (Leopard tortoise) and a shed skin of *Psammophylax* sp. (Skaapsteker) was observed during the field assessment. An overall low reptile species diversity was observed within the study area, mainly due to the ongoing anthropogenic and agricultural and grazing activities within the study area, coupled with the general secretive behaviour of reptile species. Reptile species

are most likely to be found in the more intact Bushveld and Wetland/Riparian Habitat Units as these areas provide suitable and varied habitat for reptiles and their food sources.

Figure 6: *Trachylepis punctatissima* (Montane Striped Skink) on the left and *Psammophylax* sp. (Skaapsteker) encountered during the field assessment.

The complete list of reptile SCC occurring within the Limpopo Province is included in Appendix D (LDFED, 2004).

No reptile SCC were encountered, likely due to the ongoing anthropogenic activities within the study area. One reptile SCC *Python natalensis* (Southern African Python), is however likely to be present in the study area as suitable habitat for this species is present in the Wetland/Riparian Habitat Unit. The Wetland/ Riparian Habitat Unit must be excluded from any development (apart from the required stream crossings) as to protect habitat for potential reptile SCC that may occur in the area.

3.5 Invertebrates

The invertebrate assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. As such, the invertebrate assessment is not an indication of the complete invertebrate diversity of the study area and surrounding area. A representation of commonly encountered families in the Insecta class that were observed during the assessment is listed in Table 6 below.

Table 6: General results from invertebrate observed during the assessment of the study area.

Scientific Name	Common Name	IUCN 2015 Status
Eurema brigitta	Broad-bordered Grass Yellow	NYBA
Belenois aurota	Brown-veined White	NYBA
Junonia hierta	Yellow Pansy	LC
Danaus chrysippus	African Monarch	NYBA
Trinervitermes sp.	Snouted harvester Termites	NYBA
Musca domestica	House fly	NYBA
Catantops humeralis	N/A	NYBA
Orthoctha dasycnemis	N/A	NYBA
Rhachitopis sp.		NYBA
Anterhynchium natalense	N/A	NYBA
Anoplolepis custodiens	Pugnacious Ant	NYBA
Gryllus bimaculatus	Common Garden Cricket	NYBA
Phymateus morbillosus	Common Milkweed Locust	NYBA
Conocephalus caudalis	Meadow Katydid	LC
Lycus melanurus	Hooked-winged Net-winged Beetle	NYBA
Astylus atromaculatus	Spotted Maize Beetle	NYBA
Exochomus flavipes	Black Mealy Bug Predator	NYBA
Cheilomenes lunata	Lunate Ladybird	NYBA
Spilostethus pandurus	Milkweed Bug	NYBA

LC = Least Concern, NYBA = Not yet been assessed by the IUCN

Figure 7: *Tarcus sybaris* (Dotted Blue) on the left and *Solenostethium liligerum* (Yellow heart Lovebug) on the right that were encountered during the assessment.

The results from the invertebrate survey indicate that only invertebrate species common to the area are presently found within the study area. This can be attributed to the high levels of anthropogenic effects and also with crop farming in the area, the use of pesticide can be deemed high as to control damage to crops.

A list of invertebrate SCC known to occur within the region is included in Appendix E (LDFED, 2004).

No invertebrate SCC were observed during the field assessment and it is also important to note that the distribution of all the species listed in Appendix E falls outside of the study area. The proposed development is unlikely to pose a significant threat to the Invertebrate population in the study area as most of the invertebrates have been observed in the Wetland/ Riparian and Bushveld Habitat Units, which, provided that mitigation measures as set out in this report are implemented, particularly in terms of the powerline alignment, should not be significantly impacted by the proposed project.

3.6 Arachnids

Arachnids can be notoriously difficult to observe in the field due to their behavioural habits and hiding when danger is approaching. Additionally, due to the size and nocturnal or crepuscular nature of many arachnid species it is not practical to identify all possibly occurring species during a field assessment of limited duration. Therefore an inference of possible occurring arachnid SCC has to be made by evaluating habitat suitability, prey sources and the study area location. Taking the aforementioned into consideration, it is concluded that the study area is unlikely to provide habitat for any arachnid SCC but does provide suitable habitat for a variety of other arachnid species.

During the assessment, specific attention was paid to the identification of suitable habitat for spiders and scorpions.

Four spider species were identified during the site assessment (Table 7). These species are considered to be common within the region and are not listed as threatened by either the IUCN, National or Provincial databases. All baboon spider species from the genera *Ceratgyrus, Harpactira* and *Pterinochilus* are protected under NEMBA (Act 10 of 2004) for South Africa. None were observed and the probability of them utilising the study area is deemed unlikely.

Table 7: Spider species recorded during the survey.

Common Name	Scientific Name	IUCN 2015 Status
Thomisus onustus	Crab spider	NYBA
Argiope australis	Garden orb spider	NYBA
Stegodyphus dumicola	Community nest spider	NYBA
Olurunia ocellata	Grass funnel-web spider	LC

LC = Least Concern, NYBA = Not Yet Been Assessed

Figure 8: *Stegodyphus dumicola* (Community nest spider) on the left and *Thomisus onustus* (Golden Orb spider) on the right

No scorpion species were identified within the study area. All scorpion species from the genera *Hadogenes, Opisthacanthus* and *Opistophthalmus* are also protected under NEMBA (Act 10 of 2004) in South Africa.

No threatened spider or scorpion species are listed for the Limpopo Province (LDFED, 2004) nor were any spider or scorpion SCC encountered and no such species are expected to occur in the study area. It is likely that only common arachnid species will be present within the boundary and close proximity of the study area. The smelter infrastructure, powerline alignment and access road alternatives have been placed in such a way as to minimise the impact on arachnid SCC habitat. The smelter infrastructure is placed on a cultivated land, and as such will not pose a significant threat to arachnid SCC habitat.

4 SPECIES OF CONSERVATION CONCERN

Three faunal SCC, namely *Polemaetus bellicosus* (Martial Eagle) *Coracias garrulous* (European Roller) *Pteocles gutturalis* (Yellow-throated Sandgrouse) were identified during the field assessment. Eight other SCC were found to have a 60% or greater probability of occurring within the study area and its immediate vicinity, but none were observed during the field assessment. Five SCC are indicated as threatened in the Limpopo SoER (LDFED, 2004) report and are presented in Table 8. Discussions on these eight SCC are provided in the relevant taxa sections above.

Table 8: Threatened faunal species with a 60% or greater Probability of Occurrence (POC) within or in the vicinity of the study area.

Scientific Name	Common Name	Limpopo status, 2004	BLSA Red Data List 2014	IUCN status, 2015	POC %
Felis lybica	African wild cat	VU		NYBA	64
Torgos tracheliotos	Lappetfaced Vulture	T	EN	VU	68
Gyps africanus	White-backed Vulture	T	EN	VU	68
Gyps coprotheres	Cape Vulture	T	EN	VU	64
Sagittarius serpentarius	Secretary bird		VU	VU	68
Falco biarmicus	Lanner Falcon		VU		64
Glareola nordmanni	Black-winged Pratincole		NT	NT	68
Python natalensis	South African Python	VU		NYBA	72

EN = Endangered, VU = Vulnerable, NT = Near threatened, R = Rare, NYBA = Not yet been assessed. T = listed as threatened but with no specific status for the Limpopo Province.

The species listed in the table above were then used to calculate the SCCSIS for the study area, the results of which are presented in Table 9.

Table 9: Species of Conservational Concern Sensitivity Index Score calculated for the study area.

Species of Conservational Concern Sensitivity Index Score	
Average Total Species Score	**68**
Average Threatened Taxa Score	**67**
Average (Ave TSS + Ave TT/2)	**67**
% Species greater than 60% POC	**6%**
RDSIS of Site	**37%**

Suitable foraging habitat was present for the eight faunal SCC listed in Table 8. During the field assessment of the study area, SCC that were observed directly were restricted to avifaunal species, namely *Polemaetus bellicosus* (Martial Eagle), *Coracias garrulous* (European Roller) and *Pteocles gutturalis* (Yellow-throated Sandgrouse). The study area forms part of these species home ranges and will extend well beyond that of the study area. The reduction in these species' home ranges could result in a loss of both foraging and breeding potential, as well as place them in further competition with neighbouring rivals as they attempt to compensate for the decrease in their own home range by extending into neighbouring home ranges.

The proposed development activities are thus anticipated to have a low significance impact on faunal SCC conservation within the study area and in the surrounding region, with exception of avifaunal SCC. Habitat loss for foraging for *Polemaetus bellicosus* (Martial Eagle) and *Pteocles gutturalis* (Yellow-throated Sandgrouse) will be unavoidable because of loss of large areas of cultivated fields within the study area. *Numida meleagris* (Helmeted Guineafowl) will not be able to utilise these areas for foraging, which will lead to a loss of this food source

for *Polemaetus bellicosus* (Martial Eagle). Foraging habitat for *Pteocles gutturalis* (Yellow-throated Sandgrouse), that forages on the pioneer plants within fallow lands will also be lost.

Any threat however may be lowered provided that the sensitivity map (Section A), buffer zones and mitigation measures as provided are adhered to and that no development occurs within the sensitive areas.

5 IMPACT ASSESSMENT

The impact tables below serve to summarise the significance of perceived impacts on the faunal biodiversity of the study area. The tables present the impact assessment according to the method described in Section A and indicate the mitigation measures required to minimise the impacts. In addition, an assessment of the significance of the perceived impacts is presented, taking into consideration the available mitigating measures assuming that they are fully implemented.

General management and good housekeeping practices

- Limit the footprint area of the construction activity to what is absolutely essential in order to minimise environmental damage and limit direct loss of faunal habitat;
- Provide appropriate sanitation facilities for the duration of the proposed construction activities and remove all waste to an appropriate facility;
- Construction vehicles must be confined to designated roadways and the indiscriminate movement of construction vehicles through terrestrial habitat falling outside of the construction footprint must be strictly prohibited;
- The boundaries of construction footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas;
- Avoid damage to the intact Bushveld and Wetland/ Riparian Habitat Units through careful placement of laydown areas, construction camps, topsoil dumps, etc.;
- The Wetland/ Riparian Habitat Unit must be strictly off-limits to construction personnel, except where the powerline crosses the Wetland/ Riparian Habitat Unit;
- Edge effects (impacts on areas beyond the construction footprint due to less than desirable care and management) during construction need to be strictly controlled through ensuring good housekeeping and strict management of activities near the Wetland/ Riparian Habitat Unit and associated buffers and adjacent intact Bushveld habitat;

- No dumping of construction materials and soil within Wetland/ Riparian Habitat Unit areas or associated buffers may take place; and
- All waste, with special mention of remaining building material should be removed from the site on completion of the construction phase.

5.1 Impact 1: Impact on Faunal Habitat

Activities and aspect registry

Pre-Construction	Construction	Operational	Decommissioning & Closure
Failure to plan for the development of a rehabilitation plan and alien floral control plan during the pre-construction phase	Site clearing and the removal of vegetation leading to a loss of faunal habitat	On-going disturbance of soils and habitat due to operational activities leading to altered faunal habitat	Ineffective rehabilitation of exposed and impacted areas leading to permanent losses of faunal habitat
	Loss of faunal habitat through invasion of alien species in disturbed areas	Increased introduction and proliferation of alien plant species leading to further transformation of remaining natural habitat	On-going seepage, particularly and runoff may affect the wetlands and riparian beyond closure
	Erosion as a result of infrastructure development and storm water runoff resulting in a loss of faunal habitat	Risk of discharge and contamination from operational facilities may pollute receiving environment leading to altered faunal habitat	Failure to implement a rehabilitation plan and alien floral control plan during the decommissioning and closure phase
	Movement of construction vehicles and access road construction through sensitive faunal habitat	Seepage (e.g. of the slag dump) affecting soils and the groundwater regime leading to altered faunal habitat	
	Construction of infrastructure leading to a loss of sensitive faunal habitat.	Failure to implement a rehabilitation plan and alien floral control plan during the operational phase	
	Failure to implement a rehabilitation plan and alien floral control plan during the construction phase	Increased fire frequency during operation leading to a loss of sensitive faunal habitat	
	Possible increased fire frequency during construction leading to a loss of sensitive faunal habitat		

The Wetland/ Riparian and Bushveld Habitat Units within the study area are considered to provide the high levels of faunal habitat integrity. The proposed development should therefore not encroach in these habitat areas or the wetland/ riparian buffer zone areas and edge effects from the project should be suitably managed. The proposed development is unlikely to have a detrimental impact upon permanent faunal habitat and breeding areas.

Unmanaged	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	H	L	VL	M	H	H
Operational phase	M	M	M	M	M	M
Decommissioning and closure phase	M	L	L	M	M	M

Essential construction phase mitigation measures:

- No areas falling outside of the proposed development footprint area may be cleared for construction purposes.
- The proposed development footprint areas should remain as small as possible.
- The boundaries of the development footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.
- Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat within surrounding areas, need to be strictly managed adjacent to the project footprint areas.
- All soils compacted as a result of construction activities falling outside of the project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas.
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced to prevent the ingress of hydrocarbons into the topsoil.
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.
- Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous grass species.

Recommended construction phase mitigation measures:

- Construction footprint areas may be fenced to contain all activities within designated areas.
- Such fence lines should be constructed in such a way that migratory connectivity of faunal species is not compromised, particularly where the powerline or roads cross the various riparian and wetland features and to prevent faunal species from being trapped within the development area. A 200mm gap should be left on the bottom part of the fence line so that faunal migratory connectivity is not compromised.

Essential operational phase mitigation measures:

- It must be ensured that operational related activities are kept strictly within the operational footprint.
- Alien and invasive vegetation control should take place throughout the operational phase of the development.
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced to prevent the ingress of hydrocarbons into the topsoil.
- Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed operational activities.

Recommended operational phase mitigation measures:

- It must be ensured that staff are aware of sensitive habitat areas and that these areas are not to be encroached upon.

Managed	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	M	L	VL	L	M	M
Operational phase	L	L	L	L	L	L
Decommissioning and closure phase	L	L	L	L	L	L

Probable latent impacts

- Ineffective rehabilitation of the disturbed area resulting in permanent loss of faunal habitat within the study area.

5.2 Impact 2: Impact on Faunal Diversity

Activities and aspect registry

Pre-Construction	Construction	Operational	Decommissioning & Closure
Potential poor planning of infrastructure placement and design in sensitive faunal habitat	Site clearing and the removal of vegetation leading to a loss of faunal habitat and faunal diversity	On-going disturbance of soils due to operational activities leading to altered faunal diversity	Ineffective rehabilitation of exposed and impacted areas leading to permanent losses of faunal diversity
Failure to ensure that a rehabilitation plan and alien floral control plan are created for in budgetary planning during the pre-construction phase.	Loss of faunal habitat through invasion of alien species in disturbed areas resulting in altered faunal diversity	Increased introduction and proliferation of alien plant species and further transformation of faunal habitat and diversity	On-going seepage and runoff may affect the groundwater regime beyond closure
	Erosion as a result of infrastructure development and storm water runoff leading to a loss of faunal diversity.	On-going disturbance may lead to erosion and sedimentation resulting in a loss of faunal diversity	Failure to implement a, rehabilitation plan and alien floral control plan during the decommissioning and closure phase.
	Construction of infrastructure leading to a loss faunal diversity.	Additional pressure on faunal diversity by increased human populations associated with the proposed development	
	Collision of faunal species with construction vehicles	Collision of faunal species with operational vehicles	
	Increased fire frequency during construction leading to a loss of faunal diversity	Increased fire frequency during operation leading to a loss of faunal diversity	
	Poaching and trapping of faunal species	Poaching and trapping of faunal species	

Faunal biodiversity is highest within the Wetland/ Riparian Habitat Unit and is also high within the Bushveld Habitat Unit. Faunal diversity will be negatively affected if development occurs or extends into these Habitats Units, particularly the Wetland/ Riparian Habitat Unit. Development within the Transformed Habitat Unit will have little to no impact on faunal diversity.

Unmanaged	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	H	VL	VL	L	M	M
Operational phase	M	H	M	H	M	H
Decommissioning and closure phase	M	L	L	M	L	M

Essential construction mitigation measures:

- The proposed development footprint areas should remain as small as possible and where possible be confined to already disturbed areas.
- Sensitivity map needs to be taken into consideration during the construction phase.
- Should any SCC or other larger, common faunal species be found within the Project Site, these species should be relocated to similar habitat within the vicinity of the study area with the assistance of a suitably qualified specialist.
- No trapping or hunting of fauna is to take place.
- All informal fires in the vicinity of construction areas should be prohibited.
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.

Recommended construction mitigation measures:

- It is recommended that a speed limit of 40km/h is implemented on all roads running through the study area during the construction phase in order to minimise risk to SCC and other fauna from vehicles.

Essential operation mitigation measures:

- Ensure that operational related activities are kept strictly within the operational footprint.
- Should any SCC or other common faunal species be found within the development footprint area, these species should be relocated to similar habitat within the vicinity of the study area with the assistance of a suitably qualified specialist.
- No trapping or hunting of fauna is to take place.
- All informal fires in the vicinity of construction areas should be prohibited.
- Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed operational activities.

Recommended operational mitigation measures:

- Inform staff that no dumping or disturbance is to occur within any areas highlighted as highly sensitive
- Traffic calming devices should be constructed to help manage vehicle speed to mitigate collision with faunal species.

Managed	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	M	VL	VL	VL	L	L
Operational phase	L	M	M	M	M	M
Decommissioning and closure phase	L	L	L	L	L	L

Probable latent impacts

- Decrease in faunal species diversity may lead to loss of species richness in the region over time.

5.3 Impact 3: Impact on Faunal SCC

Activities and aspect registry

Pre-Construction	Construction	Operational	Decommissioning & Closure
Poor design of infrastructure leading to loss of sensitive faunal habitat	Site clearing and the removal of vegetation leading to a loss of sensitive species	On-going disturbance of habitat due to operational activities leading to a loss of sensitive species	Ineffective rehabilitation of exposed and impacted areas leading to permanent losses of sensitive species
	Increased risk of poaching and trapping of sensitive species	Increased introduction and proliferation of alien plant species and further transformation of faunal diversity	On-going seepage and runoff may affect the groundwater regime beyond closure
	Movement of construction vehicles and access road construction through sensitive faunal habitat	Increased risk of poaching and trapping of sensitive species	Failure to implement a rehabilitation plan and alien floral control plan during the decommissioning and closure phase
	Construction of infrastructure leading to a loss of sensitive species	Collision of vehicles with faunal species	
	Collision of vehicles with faunal species	Increased fire frequency during operation leading to a loss of sensitive species	
	Increased fire frequency during construction leading to a loss of sensitive species		

Impacts on SCC within the study area are expected to be high, as the proposed smelter infrastructure, although located within a less sensitive area, is utilised by avifaunal SCC as foraging habitat. Endangered or habitat specific protected species namely *Pteocles gutturalis* (Yellow-throated Sandgrouse) and *Polemaetus bellicosus* (Martial Eagle) were identified in these areas. In order to ensure sustained habitat for these two species, it is recommended that existing cultivated lands to the east of the proposed smelter infrastructure remain under cultivation.

Unmanaged	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	H	VL	VL	L	H	M
Operational phase	H	H	L	H	M	M
Decommissioning and closure phase	M	L	L	M	M	M

Essential construction mitigation measures:

- Ensure that, as far as possible no infrastructures be placed within the Wetland/ Riparian Habitat Unit beyond of the proposed smelter infrastructure.
- The proposed smelter infrastructure area should remain as small as possible and must be confined to already disturbed and transformed areas.
- No trapping or hunting of fauna is to take place.
- Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in these areas.
- It is recommended that bird flappers be placed along the powerline in the Bushveld and Wetland/ Riparian Habitat Units indicated as areas of increased sensitivity in the floral assessment (Section B) as well as within remaining cultivated lands (should cultivation continue) in order to minimise collisions with power lines.
- Should any SCC species be noted within the Project Site, care must be taken not to disturb these species, but if unavoidable, these species should be relocated to similar habitat within or in the vicinity of the study area with the assistance of a suitably qualified specialist. Avifaunal SCC must not be disturbed, as they will fly away when they feel threatened.
- All informal fires in the vicinity of construction areas should be prohibited.

Essential operational phase mitigation measures:

- Ensure that operational related activities are kept strictly within the development footprint.
- Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the operational activities.
- An alien vegetation control plan has to be implemented in order to manage alien plant species occurring within the Project Site and remainder of the study area.

Recommended operational phase mitigation measures:

- Ongoing cultivation of agricultural fields within the study area not earmarked for development.

Managed	Intensity	Duration of impact	Extent	Consequence	Probability	Significance
Construction phase	M	VL	VL	VL	H	M
Operational phase	M	L	VL	L	L	L
Decommissioning and closure phase	L	VL	VL	VL	L	L

Probable latent impacts

- Decrease in potential SCC faunal species diversity may lead to loss of species richness overtime within the region.

5.4 Impact Assessment Conclusion

Based on the faunal impact assessment, it was found that there are three possible impacts on faunal ecology within the study area. The most significant impacts are anticipated to occur during the construction phase with fewer significant operational phase impacts expected. However, if mitigation measures as provided in this report are implemented, all impacts can be reduced from high and medium level impacts to medium and low significance impacts. Considering the impacts, should well-conceived, defined and executed management and rehabilitation practices occur, it is the opinion of the ecologist that the infrastructure development can be considered viable from a faunal perspective.

Table 10: A summary of the results obtained from the assessment of faunal ecological impacts.

CONSTRUCTION PHASE		
Impact	**Unmanaged**	**Managed**
1: Impact on faunal habitat	H	M
2: Impact on faunal diversity	M	L
3: Impact on faunal SCC	M	M
OPERATIONAL PHASE		
Impact	**Unmanaged**	**Managed**
1: Impact on faunal habitat	M	L
2: Impact on faunal diversity	H	M
3: Impact on faunal SCC	M	L
DECOMMISSIONING AND CLOSURE PHASE		
Impact	**Unmanaged**	**Managed**
1: Impact on faunal habitat	M	L
2: Impact on faunal diversity	M	L
3: Impacts on faunal SCC	M	L

6 ALTERNATIVES ASSESSMENT

A map indicating the location of the various infrastructure site layout alternatives is included in Section A: Figure 3 of this report.

Project Infrastructure Area

As a site layout alternative to Project Infrastructure Area Option 1 (preferred), which has been included as part of this assessment, Project Infrastructure Area Option 2 has been proposed. As with Project Infrastructure Area Option 1 (with the exception of the southeastern portion of the Proposed Infrastructure Area, where no or very limited infrastructure is expected to be placed), Project Infrastructure Area Option 2 is located in its entirety within the Transformed Habitat Unit which provide important habitat and foraging areas for a number of faunal SCC species. The ecological impact in terms of faunal ecology should this alternative be developed is therefore expected to be similar to that of Option 1.

Access Road

Two of the three Access Road Alternatives have been considered as part of this assessment, namely Access Road Corridor Option 2 (preferred) and Access Road Option 3. Both these access road alternatives are located within areas comprising transformed habitat due to the presence of existing roads and fencing, and the habitat associated with both these alternative is impacted to some degree. Due to the limited development footprint of the proposed access roads, and due to no faunal SCC permanently residing within either of these two access road alternatives, the ecological impact in terms of floral ecology should either alternative be developed is therefore expected to be similar. Should Access Road Option1 be developed, which is located along a similar alignment as Powerline 1, no additional impacts on the faunal ecology of the region is expected.

Powerline

In addition to Powerline Option 1 (preferred), three other Powerline layout alternatives have been identified, namely Powerline Option 2, Powerline Option 3 and Powerline Option 4. All four powerline alignments cross various watercourses which may have similar impacts on faunal habitat within these areas, with Powerline Option 1 (preferred), Powerline Option 3 and Powerline Option 4 are all located within the vicinity of largely follow existing access roads and resulting impacted areas, and will therefore result in similar impact ratings. Powerline 2 is not located within existing disturbed areas and may results in habitat fragmentation of and loss of intact faunal habitat, and therefore this alternative is the least desirable.

7 CONCLUSION AND RECOMMENDATIONS

Based on the findings of the ecological assessment it is the opinion of the ecologists that from a faunal ecological viewpoint, the proposed project be considered favorably. However, all essential mitigation measures and recommendations presented in this report should be adhered to in order to ensure the faunal ecology within the areas of increased ecological sensitivity remain intact, with particular mention of avoiding encroachment into the Wetland/ Riparian Habitat Unit (apart from at stream crossings where this cannot be avoided) and intact bushveld habitat.

Implementation of the following recommendations should be strongly considered:

- Informal fires in the vicinity of development area should be prohibited during all development phases;
- Should any *Pyxicephalus adspersus* (Giant Bullfrog) be encountered within the Project Site, special care must be taken to catch and relocate such species to similar habitat within or in the vicinity of the study area. Relocation must be done by a suitably qualified person;
- Should avifaunal SCC be encountered within the study area during the construction or operational phases of the project, care must be taken not to disturb these species, particularly when foraging;
- No trapping or hunting of fauna is to take place and all staff should be briefed and educated in this regard;
- It is recommended that bird flappers be placed along the powerline, also in areas in close vicinity to remaining cultivated fields in order to minimise collisions of avifaunal species with powerlines; and
- In order to conserve foraging habitat for avifaunal SCC, the cultivated land closest to the Wetland/ Riparian Habitat Unit should ideally remain under cultivation as this will ensure sustained habitat for the avifaunal SCC *Polemaetus bellicosus* (Martial Eagle) and *Pteocles gutturalis* (Yellow-throated Sandgrouse) within the study area.

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FAUNAL APPENDICES

Appendix A: Red Data Mammal species listed in the Limpopo DFED 2004 report including IUCN status.

Scientific name	Common Name	Limpopo DFED 2004 Status	IUCN Red List Status
Diceros bicornis	Black Rhinoceros	CE	CE
Neamblysomus julianae	Juliana's golden mole	CE	VU
Loxodonta africana	African elephant	VU	VU
Lycaon pictus	African wild dog	E	E
Amblysomus gunningi	Gunning's golden mole	VU	E
Lutra maculicollis	Spotted-necked otter	VU	LC
Acinonyx jubatus	Cheetah	VU	VU
Felis lybica	African Wild Cat	VU	NYBA
Panthera leo	Lion	VU	VU
Ceratotherium simum	White rhinoceros	NT	NT

LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN.

Appendix B: Red Data Bird species listed in the Limpopo DFED 2004 report including IUCN status.

Scientific name	Common Name	Limpopo DFED 2004 Status	IUCN Red List Status
Gyps coprotheres	Cape Vulture	T	VU
Ciconia nigra	Black Stork	T	LC
Falco naumanni	Lesser Kestrel	T	LC
Certhilauda chuana	Short-clawed Lark	T	LC
Pterocles gutturalis	Yellow-throated Sandgrouse	T	LC
Anthropoides paradiseus	Blue Crane	T	VU
Gyps africanus	Whitebacked Vultures	T	E
Ardeotis kori	Kori Bustard	T	LC
Scotopelia peli	Pel's Fishing Owl	T	LC
Bucorvus leadbeateri	Southern Ground Hornbill	T	VU
Buphagus erythrorhynchus	Red-billed Oxpecker	T	LC
Terathopius ecaudatus	Bateleur	T	NT
Polemaetus bellicosus	Martial Eagle	T	NT
Aquila rapax	Tawny Eagle	T	LC
Torgos tracheliotos	Lappetfaced Vulture	T	VU
Trigonoceps occipitalis	Whiteheaded Vulture	T	VU
Buphagus africanus	Yellow billed Oxpecker	T	LC
Stephanoaetus coronatus	Crowned hawk Eagle	T	NT

LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province.

Appendix C: Red Data Amphibian species listed in the Limpopo DFED 2004 report including IUCN status.

Scientific name	Common Name	Limpopo DFED 2004 Status	IUCN Red List Status
Breviceps sylvestris	Transvaal forest rain frog	VU	E
Ptychadena uzungwensis		P	LC
Leptopelis bocagii		P	LC
Hemisus guineensis	Guinea Snout-burrower	P	LC

LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Appendix D: Red Data Reptile species listed in the Limpopo DFED 2004 report including IUCN status.

Scientific name	Common Name	Limpopo DFED 2004 Status	IUCN Red List Status
Homoroselaps dorsalis	Striped Harlequin snake	R	NT
Xenocalamus transvaalensis	Transvaal Quill-snout snake	R	DD
Lamprophis swazicus	*Swaziland House Snake*	R	NT
Python sebae natalensis	Python	VU	NYBA
Lygodactylus methueni	Methuen's Dwarf Gecko	VU	VU
Crocodylus niloticus	Nile Crocodile	VU	LC
Lycophidion variegatum	Variegated Wolf snake	P	NYBA
Psammophis jallae	Jalla's Sand snake	P	NYBA

R = Rare, DD = Data Deficient, LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Appendix E: Red Data Invertebrates species mentioned in the Limpopo DFED 2004 report including IUCN status.

Scientific name	Common Name	Limpopo DFED 2004 Status	IUCN Red List Status
Taurhina splendens	Splendid fruit chafer *	T	NYBA
Charaxes marieps	Marieps Charaxes butterfly *	T	NYBA
Trichostetha fasicularis	Protea beetle *	T	NYBA
Ischnestoma ficqui	Fruit eating beetles *	T	NYBA

R = Rare, DD = Data Deficient, LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province. * Very little detailed or general information exists on terrestrial invertebrates in the Limpopo Province, thus in general there is very little consolidated information regarding invertebrates (Limpopo DFED, 2004).

Appendix F: SABAP2 list of bird species occurring in the GDS 2427CC.

http://sabap2.adu.org.za/pentad_info.php?pentad=2450_2710#menu_top