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BCR Coal: Vlakfontein Coal Mine: Mining Right Application

Mpumalanga Province

DESKTOP Mammal & Invertebrate Species Assessment

August 2022

Specialist Qualification & Declaration

Barbara Kasl (CV summary attached as Appendix A):

- Holds a PhD in Animal, Plant and Environmental Sciences from the University of the Witwatersrand;
- Is a registered SACNASP Professional Ecological and Environmental Scientist (Pr.Sci.Nat. Registration No.: 400257/09), with expertise in faunal ecology; and
- Has been actively involved in the environmental consultancy field for over 14 years.

I, Barbara Kasl, confirm that:

- I act as independent consultant and specialist in the field of ecology and environmental sciences;
- I have no vested interest in the project other than remuneration for work completed in terms of the Scope of Work;
- I have presented the information in this report in line with the requirements of the Animal Species and Terrestrial Biodiversity Protocols as required under the National Environmental Management Act (107/1998) (NEMA) as far as these are relevant to the specific subject and Scope of Work;
- I have taken NEMA Principals into account as far as these are relevant to the Scope of Work; and
- Information presented is, to the best of my knowledge, accurate and correct within the restraints of stipulated limitations.

04-08-2022

Acronyms

ADU	Animal Demographic Unit
AI(S)	Alien Invasive (Species)
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Areas
ESA	Ecological Support Area
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
NEMA	National Environment Management Act, 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Area Expansion Strategy
PA	Protected Area
PES	Present Ecological State
QDGS	Quarter Degree Grid Square
RIVCON	River Condition
RL	Red-listed
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern (specifically listed in the SANBI's 2020 Species Guideline)
SEI	Site Ecological Importance
SEZ	Special Economic Zone
SWSA	Strategic Water Source Area
TOP(S)	Threatened or Protected (Species)
UNESCO	United Nations Educational, Scientific and Cultural Organization
VMUS	Virtual Museum

Executive Summary

Location and Desktop Ecological Setting

BCR Coal (Pty) Ltd is proposing an open pit mining operation, hereafter referred to as the Vlakfontein Coal Mine, situated on Portion (Ptn) 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT, Ptn 1, 7, 14 and 12 of farm Welgelegen 107 IT within the Msukaligwa Municipality (Gert Sibande District), Mpumalanga Province. The project area (approximately 1800ha) includes the current anticipated development area (around 1000ha) and potential future extent of the coal resource. The development area is the focus area and overlaps Ptn 2, 11 and 12 of Vlakfontein 108 IT, with a section of the Eastern Opencast extending onto Ptn 12 of Welgelegen 107.

This study, currently at desktop level, focussed on a mammal and invertebrate assessment within the site, with broader overview of the project area.

The area is operated as active farms with small farmsteads, crop agricultural lands and stands of trees, most likely alien invasive trees (eucalyptus, poplars and wattles are most likely dominant species). Expansive areas along the east appear to be dominated by moist grasslands associated with wetlands (to be verified by the flora and wetland specialist). A small non-perennial stream, draining the western part of the site, also has tracts of seemingly undisturbed vegetation creating a narrow ecological corridor, widening northwards along the stream's coarse. An open grassland area occurs in the western extent of the development area. These grassland areas are all incorporated into areas designated as Irreplaceable CBAs in the Mpumalanga Biodiversity Sector Plan.

Terrestrial Animal Species

- Of the SCCs:
  - The Oribi has one confirmed record and the project area falls within its distribution range and species is considered likely on site pending site assessments.
  - The Maquassie Musk Shrew has not been historically or recently recorded in the greater area, even though the project area is within the larger distribution range of the species. There is little conclusive information about the species, and the species is only linked to moist habitats associated with wetlands. The species is retained as a possible species on site pending field assessments.
- Five historically recorded TOP species (Black-footed Cat, Spotted-necked Otter, Serval, Honey Badger and Southern African Hedgehog) and three TOP species with distribution over the area (Brown Hyaena, Cape fox and Southern Reedbuck) could occur in the project area as they have wide habitat tolerances or will utilise wetland habitats on site.
- The area is not an area of mammal endemism and no impact is expected to restricted endemic species.

In terms of invertebrates:

- No SCCs were listed in the Environmental Screening Tool Report.

- No TOP species or provincially protected species were recoded in the Quarter Degree Grid Square (QDGS) relevant to the project area.
- No significant invertebrate SCCs are expected in the area.

Terrestrial Fauna Biodiversity Features

The following significant ecological desktop features have been identified for the project area and site:

- The area is within the 5km buffer of the Chrissiesmeer Pans Systems designated as a protected environment composed of natural and modified land.
- The site is within a NFEPA Water Management sub-catchment and the project area extends into a Fish Support Area NFEPA Catchment; both catchments are also fish sanctuaries.
- Although the NFEPA rivers around the area are considered modified, the Vaal River is the main receiving water body for runoff from the area and becomes a significant regional, and eventually provincial, riverine ecological corridor and water resource.
- The area has designated Mpumalanga Highveld Wetlands which incorporate Rank 2 NFEPA wetlands and wetland clusters.
- The project area is mostly designated as Irreplaceable CBAs with patches of Moderately and Largely Modified Lands. Irreplaceable CBAs incorporate natural areas required for the province to meet its biodiversity targets with severe land use restrictions.

Desktop Site Sensitivity

In terms of the desktop findings the site desktop sensitivity is regarded as follows:

- Highly sensitive areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the Irreplaceable Critical Biodiversity Areas (CBAs) on site, with the eastern CBA the potential primary biodiversity hotspot in terms of mammals and invertebrates. In the surrounds, highly sensitive areas incorporate the riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary south east of the project area.
- Moderately sensitive areas currently include the on-site non-perennial stream. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does not provide a significant ecological corridor and has limited buffer habitat within the proposed development site, the sensitivity of the habitat is reduced to moderate.
- Areas with low sensitivity include the cleared and developed areas, alien invasive tree stands and areas under crop agriculture.

Plan of Study

The plan of study will incorporate the animal species protocols for Medium Sensitivity Rating and also include discussion of terrestrial and aquatic biodiversity features of relevance to terrestrial fauna. The following will be undertaken:

- A site assessment, by way of meanders within broader habitat units (crops, grasslands, moist grassland, riverine areas and AIS tree stands), will be undertaken after the first rainfalls in the following spring / summer season.
    - Survey will focus on the grasslands, moist grasslands and riverine areas which are more likely to host the two trigger SCCs, as well as the suspected TOP species.
    - Focusses surveys will be undertaken in the development site with less intensive surveying of the project area and visual assessment of areas beyond where visible.
    - Active searching will be completed for the SCCs in appropriate habitat units (or assumed appropriate habitat in terms of data deficient species).
- The current likelihood of SCCs and TOP species occurring on site will be updated based on field assessment findings.
- As SCCs / TOP species are likely on site, the Terrestrial Animal Species Specialist Assessment protocols will be followed and include the following items, where the information can be reasonably gathered:
    - If physically observed and where possible, photographs and the number of SCCs / TOP species observed, including any population information that can be gained during brief sighting with such species.
    - Discussion on the important ecological drivers, processes and services as may be relevant, with focus on those of importance to confirmed or likely SCCs / TOP species.
    - Detailed impact assessment on SCC / TOP species populations, their habitats, and ecological functions that may be important to the survival of local SCCs / TOP species; provide management recommendations to mitigate negative impacts of the activities on terrestrial fauna.
    - Discussion on buffer distances for the SCCs / TOP species where this is relevant to the species in the specific setting.
    - Assess site ecological importance based on site survey findings.

Professional Opinion and Recommendations

As per the Mpumalanga Biodiversity Conservation Plan Handbook, land use in Irreplaceable CBAs must be in line with Conservation Management as all natural areas are required for the province to meet its biodiversity targets. Extensive game and stock farming may be considered as a land use if regulated under prescribed conditions (Ferrar and Lötter, 2007). Offsets for irreplaceable CBAs will only be considered under exceptional circumstances (Ferrar and Lötter, 2007), although such circumstances are not detailed in the handbook.

The current DRAFT National Biodiversity Offset Guideline (October 2021) is the first to tackle offset areas for terrestrial landscapes in the environmental legal arena. This document has the following definitions: “fatal flaw [...] means a major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating...”

In light of the desktop status and in absence of site-based knowledge (actual site ecological status rather than the desktop information), impact significance on biodiversity and implications for mitigation, there

exists a **POTENTIAL** fatal flaw which **MAY** require amendment to current proposed development and activities (alternative project methods or layouts that preserve confirmed natural areas) and consultation with Mpumalanga Parks and Tourism Agency as to potential for offset areas if this becomes relevant.

The following recommendations are relevant at this stage:

- The Mpumalanga Parks and Tourism Agency must be consulted as soon as possible in terms of the proposed development.
- The field assessment must be completed and this report updated with findings as per the plan of study.
- The rehabilitation plan must be drafted as part of the environmental management programme (EMP).
- The development is likely to contribute to the exacerbation of existing AI species, which must be managed on site in line with the municipal alien invasive management strategy (where one is in place).
- The development will contribute to increased risk of contaminated and silt-loaded runoff. This could enter the natural streams during heavy rainfalls and activities must be managed to reduce the risk of such impacts. Preliminary plans to manage storm water runoff and contain and treat of contaminated water must be submitted with the EMP.

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1. Introduction & Site Characterisation

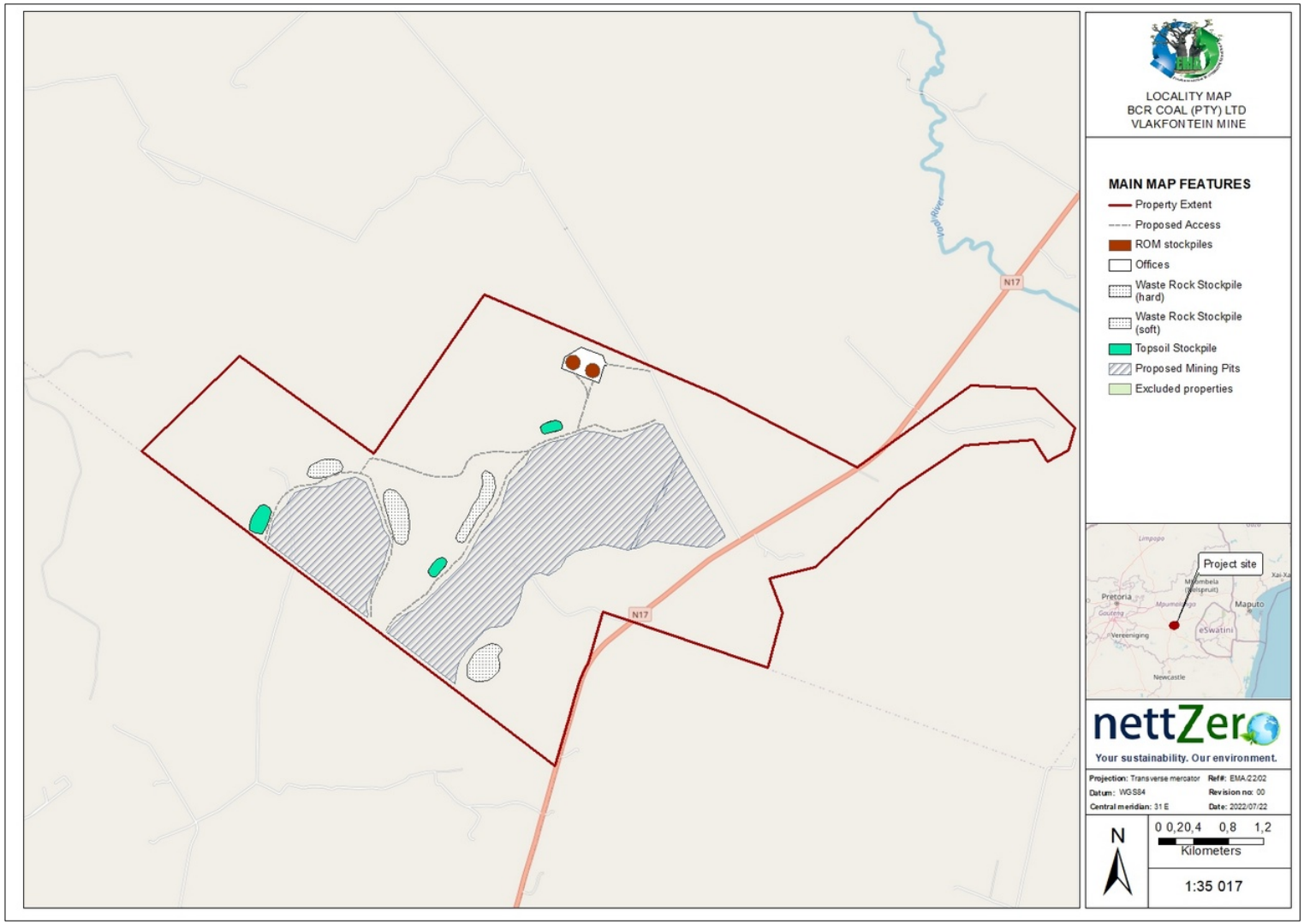
BCR Coal (Pty) Ltd is proposing an open pit mining operation, hereafter referred to as the Vlakfontein Coal Mine, situated on Portion (Ptn) 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT, Ptn 1, 7, 14 and 12 of farm Welgelegen 107 IT within the Msukaligwa Municipality (Gert Sibande District), Mpumalanga Province. The project area (approximately 1800ha) includes the current anticipated development area (around 1000ha) and potential future extent of the coal resource (Plan 1). The development area is the focus area and overlaps portions 2, 11 and 12 of Vlakfontein 108 IT, with a section of the Eastern Opencast extending onto Portion 12 of Welgelegen 107.

The surface sub-outcrop of the coal seams is planned to be mined using an advancing open pit mining method which allows for concurrent filling of the pit. The pit will be used to develop portals which will allow the remainder of the ore to be exploited using underground mining methods. The open pit planned applies a conventional opencast truck and shovel mining philosophy including the following steps:

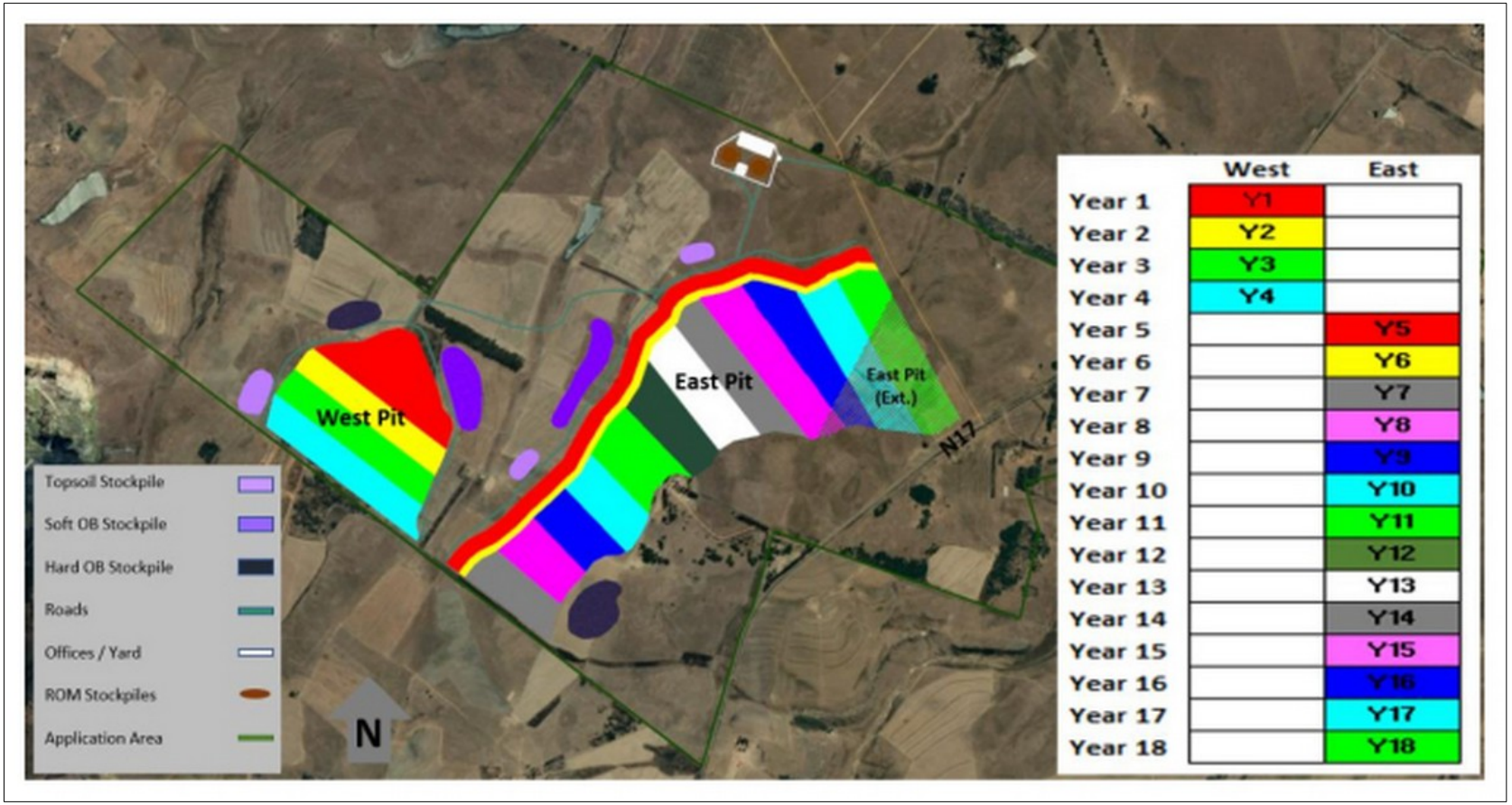
- Removal of topsoil and storing it at a designated position;
- Removal of the overburden;
- Drilling and blasting will be required to break the hard overburden;
- The waste will be dumped in the pit behind the advancing face where possible with the remainder placed at the designated waste rock stockpile, separate from the topsoil;
- Drilling and blasting of the coal seams;
- Loading and hauling of the ore for stockpiling at the Run-of-Mine (ROM) pad and for transport to the preferred Washing Plant.

The open pit mining philosophy is based on a contractor-operated operation. A production shift cycle operating 9 hours a day, 6 days a week will be adopted. The open pit layout and the life of mine schedule is presented in Plan 2. The project footprint will require the support facilities and infrastructure in order to operate. The infrastructure requirements are:

- Access & Haul roads (with necessary security) including the upgrading of the access point to mining area;
- Contractor's Yard with septic/chemical ablution facilities;
- Offices;
- Weighbridge, workshop and stores (with septic/chemical ablution facilities);
- Diesel facilities and a hardstand;
- Power and Water;
- Stockpiles (topsoil, overburden (waste), subsoil/softs, ROM);
- Crushing and screening facility;
- Surface water management measures (stormwater diversion berms and trenches; pollution control dams etc);
- Medical station; and
- Diesel Generator.



Plan 1: Project area (indicated by property extent) and main development area relevant to the proposed Vlakfontein Coal Mine



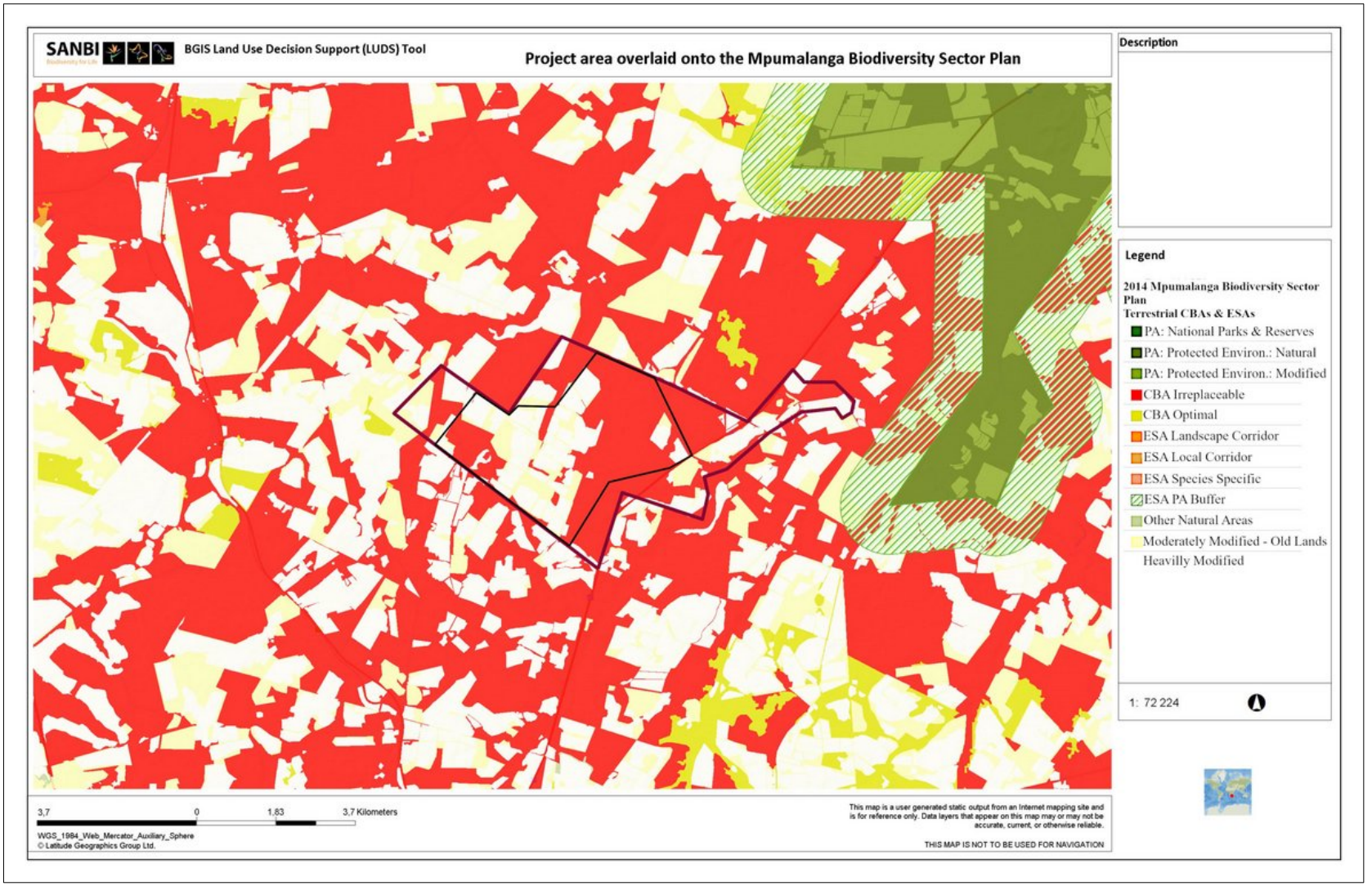
Plan 2: Proposed opencast mining schedule and initial infrastructure layout (Mine Works Programme)

Table 1 provides a summary of the desktop ecological features, and in some cases features regulated under environmental law (streams, protected areas, etc.), on and around site that are of relevance to terrestrial fauna (habitat, prey-base, ecological corridor, water provision).

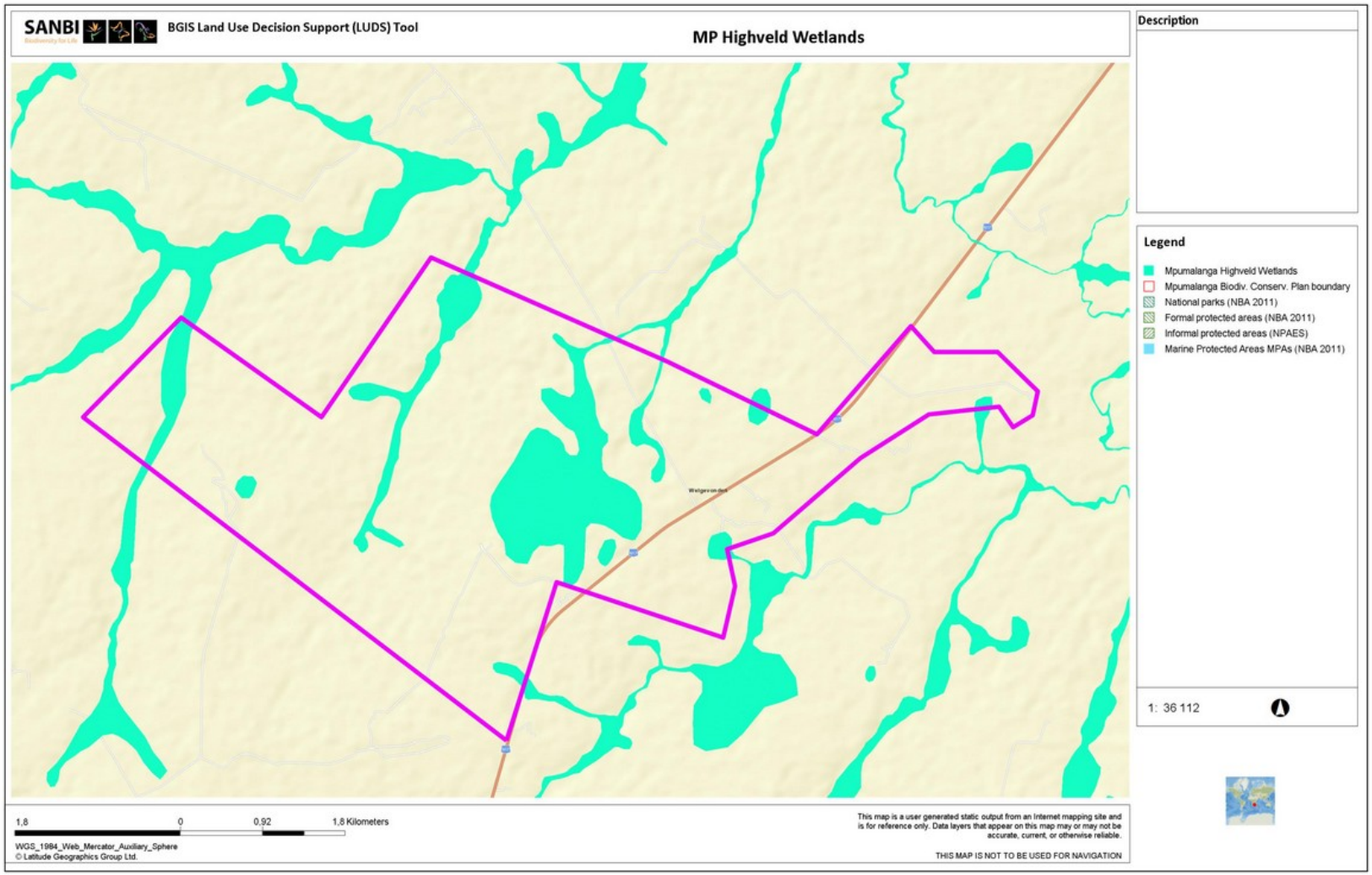
Table 1: Desktop ecologically significant features (distances are "as the crow flies" approximations)

Ecological area	Description of feature relevant to the project area
International Conservation	No RAMSAR Wetlands or World Heritage Sites occur within 50km of the site.
Local conservation areas (Plan 3)	No Formal or Informal Protected Areas (PAs) occur within 10km of the project area (as per SANBI Spatial Datasets). The Chrissiesmeer Pans Systems are within a demarcated protected area in the Mpumalanga Biodiversity Sector Plan (Chrissiesmeer PA). The 1km buffer zone of this protected area is less than 700m from the project area (1.7km to the protected area) and 3.4km from the eastern extent of the eastern opencast pit (4.4km to the protected area). The protected area is contained within the Chrissie Pans Important Birds Area (IBA), which extends into the project area and incorporates the Welgelegen Properties. The pans form part of the largest cumulative inland water body in South Africa and consists of predominantly rainfall-fed pans and lakes, representing a variety of aquatic habitats, including reeds, sedges and saline pans (Marnewick *et al*, 2015). Although birds are not within the scope of this study, the site is managed as a conservancy and will support other fauna species indigenous to the area and is considered a unique habitat and biodiversity hotspot for fauna, including mammals and invertebrates. Furthermore birds and eggs are also a food source for many other fauna. No National Protected Area Expansion Strategies (NPAES) occur within 10km of the project area.
National Freshwater Ecology Priority Areas (NFEPAs)	The site is within a NFEPA Water Management sub-catchment. The project area extends into a Fish Support Area NFEPA Catchment in the south-east. Both catchments are also fish sanctuaries (aquatic species outside scope of work). The site drains via an on-site non-perennial tributary which flows north and then north-west to confluence with the Moderately Modified (PES C; RIVCON AB) Vaal River, 4km north-west of site. The south-eastern part of the project area drains south-east into the Moderately Modified (PES C) perennial tributary of the Vaal River (Vaal Tributary), which flows outside the south-eastern boundary of the project area to confluence with the Vaal River, approximately 4.6km east of the site. Rank 1 or 2 NFEPA wetlands are designated as important habitat for Red-Listed water birds, cranes and frogs. The proposed Eastern Opencast and Infrastructure Area and associated roads are within a wetland cluster which has five (5) NFEPA Rank 2 Wetlands, all designated as potential Crane habitat. This overlaps with the Mpumalanga Highveld Wetlands (Plan 4). There is an additional Rank 2 Wetland in the far western extent of the project area, also designated for potential Crane Habitat. There are also several Rank 2 wetlands around the project area, specifically the wetlands within the Chrissiesmeer PA.
Strategic Water Source Areas (SWSAs)	No Strategic Water Source Areas occur within 10km of site. The Upper Vaal surface water resource occurs approximately 12km downstream of site, along the Vaal River and can be considered within the potential area of influence. The Vaal River is an important perennial water supply and aquatic riverine habitat, forming a regional and provincial ecological corridor.
Biome and Ecosystem	The project area falls within the Grassland Biome and the Eastern Highveld Grassland vegetation unit. The site and most of the project area falls with in the Vulnerable Eastern Highveld Grassland Ecosystems (NEM:BA, GN1002, 2011). The far north-eastern extent of the project area falls within the Endangered Chrissiesmeer Panveld Ecosystem (NEM:BA,

Ecological area	Description of feature relevant to the project area
	GN1002, 2011). Neither ecosystem is exclusively utilised by specific mammals species, but natural habitat units are important for terrestrial fauna biodiversity.
Mpumalanga Biodiversity Sector Plan (Plan 3)	The project area is mostly designated as Irreplaceable CBAs with patches of Moderately and Largely Modified Lands. As per the Mpumalanga Biodiversity Conservation Plan Handbook Land use in Irreplaceable CBAs must be in line with Conservation Management as all natural areas are required for the province to meet its biodiversity targets. Extensive game and stock farming may be considered as a land use but regulated under prescribed conditions (Ferrar and Lötter, 2007). Offsets for irreplaceable CBAs will only be considered under exceptional circumstances (Ferrar and Lötter, 2007), although what constitutes exceptional circumstances are not detailed.
Quarter Degree Grid Square	The site and project area are within Quarter Degree Grid Square (QDGS) 2630AC. All desktop data obtained from the citizen science sites have been sourced for this QDGS.



Plan 3: Project area and development site in relation to the Mpumalanga Biodiversity Sector Plan (SANBI, BGIS Map Viewers)



Plan 4: Project area (magenta outline) in relation to the Mpumalanga Highveld Wetlands (green polygons) (SANBI, BGIS Map Viewers)

1.1 Scope of Work

Separate specialist aviafauna and herpetology assessments are being undertaken and this report focusses on mammals and invertebrates only.

The site is ranked as medium sensitivity (no prior records but habitat may be present for the species on site) for two mammal species of conservation concern (SCCs). No invertebrate SCCs are listed for the area. Habitat assessments will be conducted with a focus on the SCCs. No species-specific trapping will be undertaken, but recommendations will be made, if needed, based on habitat assessments. In terms of terrestrial animal species protocols (GN1150 of 2020), the final report will be in line with the requirements of a Terrestrial Animal Species Specialist Assessment Report.

The site is ranked as very high for aquatic biodiversity and very high for terrestrial biodiversity. This report will incorporate a discussion of the aspects in the terrestrial biodiversity and aquatic biodiversity protocols of relevance to terrestrial animals.

As per National Environment Management Act, 1998 (Act No. 107 of 1998) (NEMA) EIA Regulations (GNR982, 2017) and the requirements of the EIA Screening Tool Protocols for the Assessment and Reporting of Environmental Themes for animal species (GN1150 of 2020) and also consideration of biodiversity (GN320 of 2020), the following is relevant regarding the scope of work considering the site status:

- Assess and comment on the significance of the terrestrial fauna habitat components and current general conservation status of the property in terms of SANBI BGIS data (Table 1).
- Comment on the likelihood of threatened or protected (TOP) and potential SCC fauna occurring on site (to be finalised on completion of field work).
- Discuss important ecological drivers, processes and services as may be relevant (to be finalised on completion of field work).
- Address site sensitivity and ecological importance based on site survey findings in relation to regional ecological setting (to be addressed on completion of field work).
- Complete an impact assessment and provide management recommendations to mitigate negative impacts of the activities on terrestrial fauna (to be finalised on completion of field work).

1.2 Legislative Context

The National Environment Management Act, 1998 (Act No. 107 of 1998) (NEMA), NEMA Environmental Impact Assessment (EIA) Regulations (GNR982, 2017) and the requirements of the EIA Screening Tool Protocols for the Assessment and Reporting of Environmental Themes for animal species (GN1150 of 2020) and also consideration of biodiversity (GN320 of 2020) are the main legislation governing the necessity and approach of the animal species and fauna biodiversity assessment. In addition to NEMA and the Environmental Themes Protocols discussed above, the following are relevant:

- The National Environmental Management Biodiversity Act, 2004. (Act 10 of 2004) (NEM:BA).
- The National Environmental Management: Protected Areas Act (Act 57 0f 2003) (NEM:PAA).

NEM:BA and its regulations are of particular importance in terms of the fauna and flora ecosystems. The principal regulations considered within this report are:

- The National Environmental Management: Biodiversity Act (10/2004): Threatened or Protected Species Regulations. General Notice 152 of the 23/02/2007;
- The National Environmental Management: Biodiversity Act (10/2004): Publication of lists of species that are threatened or protected, activities that are prohibited and exemption from restriction. General Notice 151 of the 23/02/2007;
- The National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Lists. General Notice 1003 of 18 September 2020; and
- National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations. General Notice Regulation 1020 of 18 September 2020.

In addition, the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) provides for conservation of biological resources and lists the species protected within the province as Protected Game and Protected Wild Animals. As the activity / development does not intend any specific scheduled activities involving animals the provincially protected species are not discussed further in detail in the report. Should any animal need to be trapped, handled or transported in any way then the necessary provincial permits must be obtained.

2. Methodology and Plan of Study

2.1 Desktop Ecological Status

The desktop assessment utilised predominantly SANBI BGIS data as detailed in Table 1, accompanied by assessment of Google Earth satellite imagery.

2.2 TOP Species Desktop Lists

A high level threatened or protected (TOP) species assessment was undertaken, which incorporates the potential SCCs. The term TOP species was coined in terms of the threatened and protected species lists published under NEM:BA's General Notice 151 of 2007 (GN151, 2007). In this report TOP species also includes threatened (Vulnerable, Endangered, Critically Endangered) Red-listed and IUCN (IUCNredlist.org) species (Near Threatened species are not included, but status is indicated where species is listed as threatened under another listing). Distribution and general information as presented in this report were sourced for:

- Mammals [sourced from Child, *et al*. (2016) as presented in the mammal Red-list on SANBI.org.za, and the Endangered Wildlife Trust Red-listed mammal fact sheets on ewt.org.za/reddata; supplemented by Stuart and Stuart (2013), Stuart and Stuart (2015), Murray (2011), Monadjem *et al*. (2010a) and Monadjem *et al*. (2010b)].
- Invertebrates [also supplemented by Picker *et al. (*2012), Woodhall (2005) and SANBI Biodiversity Advisor Animal Checklists for ants, millipedes, Orthoptera and scarabs]:
    - Butterflies [Mecenero *et al*. (2013) as obtained from the South African Butterfly Conservation Association lists].

- Dragonflies (Samways & Simaika, 2016).
- Spiders (Dippenaar-Schoeman *et al.*, 2010).
- Scorpions (Leeming, 2019).

Endemic species for mammals were also indicated where relevant. Variation between sources on endemic species (just South Africa or South Africa, Lesotho and Swaziland) is not seen as critical in terms of this report.

In order to determine recent fauna diversity data, various citizen science sites were consulted and Mpumalanga Parks and Tourism was contacted for species data:

- Mammal and available invertebrate species lists for the QDGS over the last 10 year period were obtained from the Virtual Museum of the Animal Demographic Unit (VMUS.ADU.org).
- iNaturalist (iNaturalist.org) was consulted for presences of potential TOP mammal and invertebrate species.
- Dr Mervyn Lötter, Control Scientist: Biodiversity Planning at the Mpumalanga Tourism and Parks Agency provided species data for the greater area.

Exotic and / or Alien Invasive (AI) Species (AIS), recorded in the area as per the citizen science sites, are also discussed where relevant.

2.3 Site Assessment

Field work is planned for spring to summer, after at least some summer rainfall to the area. In terms of the animal species protocols, medium ranks for sensitivity indicate that the species has not been confirmed in the area, but habitat may be present based on National desktop geographic modelling data. Habitat assessments will therefore be conducted with a focus on the SCCs. Meanders will be completed across the project area, focussing on the development site, with active searching completed for SCCs and signs of SCCs in appropriate habitat units, largely associated with areas designated as Irreplaceable CBAs (Plan 3). During meanders the areas will be assessed for micro-habitats, signs of fauna and fauna.

2.4 Likelihood of TOP Species

For the desktop TOP species, a probability assessment to determine the likelihood of species occurring on site was completed. The probability assessment should be seen as a ranking system rather than an absolute and is designed to reduce subjectivity of results. At this stage the assessment has been done at a desktop level, and will be updated once field work is completed. Likelihood of occurrence was generally assessed as follows:

- Confirmed: either through past surveys, citizen science sites and local knowledge where provided.
- Likely: Distribution of the species occurs over the site and the site and immediate surrounds provide habitat, roosting and food requirements of the specific species. There is nothing to prevent the species from residing on site for a length of time (breeding season or year).
- Possible: Distribution of the species occurs over the site but the specific habitat, roosting and/or food requirements are absent or sparse on site, but are present in the greater area.

Species are not likely to reside on site, but may forage over or traverse the site. Species population is likely to be at low density over site.

- Unlikely: Distribution is on the edge of site and habitat, roosting and/or food requirements are absent or sparse in the sites and surrounds. Species population is at low density and erratic over site or no recent records in the area.

2.5 Fauna Impact Assessment, Management & Monitoring Plan

Impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development / activity plan. This does not mean that the impact will occur at the predicted significance.

Impact statements will be considered for each of the sensitive faunal species and ecological features of relevance to terrestrial fauna. A detailed impact assessment will be completed of impacts relevant to the project in accordance with NEMA requirements (Appendix 3 of the EIA Regulations) once the field assessment is completed.

The main to phases that will impact on fauna are the construction phase and operational phase. The construction phase will commence upon granting of a mining right and will include the following items and expected time frames:

- Preparation of Access Roads (3 Weeks)
- Construction of contractor's yard. (1 Week)
- Workshop Construction (3 Weeks)
- Fencing and trenching of Mining Area (4 Weeks)
- Construction of Security (Boom Gates, Security house) (4 Weeks)
- Installation of Weighbridge (3 Weeks)
- Construction of Diesel bunds and Installation of Tanks (2 Weeks)
- Construction of Mine haul roads (4 Weeks)
- Development of trenches and pollution control facilities (8 Weeks)
- Setting up crushing and screening plant (8 weeks)

The mining method will comprise of the following main mining activities for both overburden and coal during operational phase:

- Topsoil and soft overburden removal;
- Drilling of hard overburden material;
- Charging and Blasting;
- Loading and Hauling; and
- Tipping or Dumping.

The objectives of the management plan will be as follows:

- To prevent the unnecessary destruction of natural habitat and animal life within the development area and to maintain ecological connectivity to neighbouring sites and, where possible, to regional ecological corridors.

- Not to unnecessarily or deliberately alienate or hinder the movement of fauna in the area or to harm any animal life found on the property.
- To maintain existing fauna biodiversity and prevent the skewing of fauna communities as far as possible.

3. Assumptions and Gaps in Knowledge

The current environmental authorisation timing for the project will not allow for field work to be completed in an appropriate season and this report has been compiled as a detailed desktop assessment to ensure the application process can continue with the Scoping phase and report within the allotted NEMA time-frame. This report will be updated and re-submitted once the field work is completed as part of the S&EIR phase of the environmental application process.

The animal species guidelines (SANBI, 2020) requires assessment of potential areas of influence. This reports does explore areas of influence beyond site borders where relevant (for example downstream and catchment level impacts to potential fauna habitats and ecological corridors, or the migration / dispersion pathways of animals from conservation areas). Working with various fauna means the area of influence varies, but the discussion within this report is deemed to more than adequately address the areas of potential influence, although they are not necessarily mapped.

The animal species protocols require academic-level information on species population demographics which is not possible with mobile animals that are startled by, and run away from, observers. Where such information is readily available, or can be collected during field surveys, this will be done in accordance with the protocols.

It must be stressed that the survey area is a much smaller area within the larger QDGS area utilised for desktop species, and species presented in these databases may not have been recorded at the specific site.

Larger herbivores have not been fully evaluated within this report as these species are actively fenced in and managed within selected areas. Where they are historically recorded TOP species they are included in the relevant table / appendix of this report, but are not further discussed at length. This is further extended to large carnivore predators of such species (e.g. Lion). Rhinos and elephants are completely excluded due to sensitivity of information. As these species are largely restricted to reserves and game farms this is not seen as a significant omission.

A few species are data deficient species, such as the Mpumalanga Cape Mole-rat population and Maquassie Musk Shrew relevant to this study site. Information on species is limited and extrapolation is often required. A cautionary approach has been taken with such species.

There are inherent errors in mapping programmes which must be considered with all mapping information presented.

Citizen Science projects were used for animal (ADU) baseline data. When utilising data from Citizen Science projects, the following must be kept in mind:

- Public interest in sites may be fickle, and may wane and increase, which could have a direct effect on the number of records available and therefore the number of species recorded.
- Populated areas or popular tourist destinations may have more participants and therefore higher biodiversity data than less populated areas.
- Misidentification of species by the public cannot be excluded, but is not seen as a major problem as a degree of vetting does take place.
- It must also be considered that animals observed in captivity may be recorded by citizens. Such animals should not be considered part of the natural biodiversity but as the data provided by citizen science sites do not make such distinctions, it cannot be separated from the biodiversity data presented in this report.

Due to the low resolution of some distribution maps and the mobility of animals, distribution data utilised to present animal lists are not 100% accurate. Proper distribution data for the TOP invertebrates is scant and it is difficult to conclusively state if every species does or does not occur in the area.

4. Results

From Table 1 the following desktop features have been identified for the project area and development site:

- The area is within the 5km buffer of the Chrissiesmeer Pans Systems designated as a protected environment composed of natural and modified land; the project area remains outside the 1km ESA buffer of this protected environment. The protected areas and the 1km ESA buffer area are indicated in Plan 3.
- The site is within a NFEPA Water Management sub-catchment and the project area extends into a Fish Support Area NFEPA Catchment; both catchments are also fish sabctuaries. Although fish are outside the scope of this study, they are critical food source to many other fauna species, including mammals.
- Although the NFEPA rivers around the area are considered modified, the Vaal River is the main receiving water body for runoff from the area and becomes a significant regional and, eventually provincial, riverine ecological corridor. It is also becomes a major water source along its downstream course.
- There are designated Mpumalanga Highveld Wetlands in the project area which incorporate Rank 2 wetlands and wetland clusters.
- The project area is mostly designated as Irreplaceable CBAs (approximately 53% of the physical development footprints overlap designated irreplaceable CBAs) with patches of Moderately and Largely Modified Lands. Irreplaceable CBAs incorporate natural areas required for the province to meet its biodiversity targets with severe land use restrictions.

The field assessment will be undertaken at during spring to early summer. Only a desktop evaluation is provided in this report.

From Google Earth Imagery (including historical imagery) the area is operated as active farms with small farmsteads, crop agricultural lands and stands of trees, most likely alien invasive trees (eucalyptus, poplars and wattles are most likely species). Expansive areas along the east appear to be largely undisturbed by extensive surface activity and are likely dominated by moist grasslands

associated with the Mpumalanga Highveld Wetlands (to be verified by the flora and wetland specialist). A small non-perennial stream draining the western part of the site also has tracts of undisturbed vegetation creating a narrow ecological corridor, widening northwards along the stream's coarse. A final significant open grassland area occurs in the western extent of the development area. These seemingly natural grassland areas are all incorporated into areas designated as "Irreplaceable CBAs" in the Mpumalanga Biodiversity Sector Plan.

The complete desktop mammal list as extracted from the ADU and iNaturalist citizen science sites is included in Appendix B. The TOP and endemic species extracted from this list are further discussed below and discuss, as relevant, the SCCs, other historically recorded TOP species, other likely TOP species and endemic species, focussing on species that are highly likely to occur on site for extended periods and therefore most likely to be exposed to the development and potential impacts. Invertebrates are discussed more generally.

4.1 Mammals

In terms of the ADU list and historical species (Appendix B), the following is relevant:

- Unidentified species on the ADU list have not been included in this report.
- Species names are indicated as per the latest mammal Red-Lists (Child *et al.*, 2016).
- *Lepus victoriae* has a distribution over the area of interest and has replaced the ADU *Lepus saxatilis* which does not.

4.1.1 Historical & Likely TOP & Endemic Species

The previously recorded TOP and endemic mammals for the area and those with distributions across the area are indicated in Table 2.

The following mammal SCCs are listed in the Environmental Screening Tool Report:

- Oribi (*Ourebia ourebia*) (GN151 Endangered; RL Endangered) (Shrader *et al.*, 2016).
  - Main threats include habitat destruction, illegal hunting, poor farm management practices, poor law enforcement, including the lack of coordinated / cooperative management and lack of awareness of the status, threats and legal repercussions of killing Oribi.
  - The project area falls within the species' main distribution range.
  - One species record is confirmed for the QDGS over the last decade in 2015.
  - The species has a preference for open, natural grasslands with a mosaic of short grass (for feeding) and tall grass (for cover and also feeding). They are often associated with floodplains and moist grasslands. The species will also utilise wooded savanna habitats. The habitat units are expected to be present and adequate for the species.
  - In terms of the above, the species is considered as likely to occur on site.
- Maquassie Musk Shrew (*Crocidura maquassiensis*) (RL Vulnerable) (Taylor *et al*., 2016).
  - Main threats are loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat due to abstraction of surface water and draining of wetlands through industrial and residential expansion and overgrazing of moist grasslands.

- The project area is within the larger distribution range of the species but no recent records occur for the species in the area or within the QDGS. No historical records occur for the species near the project area.
- There is little conclusive information about the species, but the species is linked to moist habitats with dense matted vegetation, associated with wetlands.
- In terms of habitat, the species may occur on site, but the lack of historical and recent records in the greater area makes it unlikely, although existing national records are scant. The species is retained as a possible species in the project area.

None of the TOP species recorded on the ADU can be conclusively excluded from site. As per limitations (Section 2.6), the Black Wildebeest and Sable Antelope are not further discussed. The following species have been recorded for the QDGS:

- Black-footed Cat (*Felis nigripes*) (GN151 Protected; RL Vulnerable; IUCN Vulnerable). The species will be confined to the natural grasslands with appropriate cover and resources (termite mounds and dens of other borrowing species). Main threats include intra-guild predation, diseases, declining Springhare populations, habitat degradation that results in the loss of key resources (dens and prey base), and unsuitable farming practices. Occurrence is highly fragmented and patchy, which may have resulted in island sub-populations resulting in limited dispersal opportunities and restricting genetic exchange. Species numbers are also impacted through indirect persecution (Wilson *et al.*, 2016).
- Spotted-necked Otter (*Hydrictis maculicollis*) (GN151 Protected; RL Vulnerable).The species will be associated with water bodies, more likely the perennial rivers in the surrounds, but cannot be excluded from site if permanent water bodies develop during the rainy season. Species may also forage in the area or wonder through the area. Main threats include crop and livestock agricultural practices leading to bank and shoreline erosion, denuding important vegetative cover used by otters, increased human presence and disturbance, increased use of mesh nets and poisoning in fishing, and change or depletion of their prey base. Human settlement expansion and disturbance increases habitat degradation from pollution and increases incidences of persecution. Otters are killed for food or skins, or as a perceived threat to poultry and / or fish (Ponsonby *et al*., 2016).
- Serval (*Leptailurus serval*) (GN151 Protected; RL Near Threatened). The species will be associated with moist areas with good reedy cover associated with the rivers and wetlands in the area. Main threats include loss and degradation of wetlands and associated grasslands. Wetlands generally harbour high rodent densities compared with other habitat types, and form the core areas of Serval home ranges; disruption to such habitats reduces prey-base which impacts the species (Ramesh *et al*., 2016).
- Honey Badger (*Mellivora capensis*) (GN151 Protected). The species has wide habitat tolerances and is more likely to be limited by existing human activity on site. Main threats to the species arises from conflict with, and persecution by, bee farmers (Begg *et al*., 2016).
- Southern African Hedgehog (*Atelerix frontalis*) (GN151 Protected). The species has wide habitat tolerances and is more likely to be limited by existing human activity and domesticated animal activity on site. Main threats include habitat loss, degradation and fragmentation from urban sprawl and agriculture. Also threatened by illegal harvesting from the wild for food, or for sale as pets and traditional medicine (Light *et al*., 2016).

Other TOP species with distribution over site and which cannot be excluded from site (pending site findings) include the:

- Brown Hyaena (*Parahyaena brunnea*) (GN151 Protected). Species has wide habitat tolerances but is generally associated with drier habitats. They are often shot, poisoned,

trapped, snared and hunted with dogs in an attempt to reduce livestock predation events (Yarnell *et al.*, 2016).

- Cape fox (*Vulpes chama*) (GN151 Protected). Species has fairly wide habitat tolerances as long as it is open country. Cape Foxes are hunted, poisoned (directly and also indirectly by agricultural chemicals) and caught in traps for other species. Species is also affected by road mortalities (Kamler *et al*., 2016).
- Southern Reedbuck (*Redunca arundinum*) (GN151 Protected). The species will be associated with moist areas with reedy cover around the rivers and possibly the wetlands in the area, but do forage within drier terrestrial habitats. The species was impacted by habitat transformation and degradation associated with agricultural activities and settlements. On agricultural land, they are possibly subjected to persecution due to damage to pastures and crops. Species is also susceptible to hunting, snaring and poaching (du Plessis *et al*., 2016).

None of the endemic mammals recorded in the area or identified as likely on site (Table 2) are restricted and the area is not an area of mammal endemism.

4.1.2 Alien & Exotic Species

None were recorded for the QDGSs. Domesticated animals and stock animals can be expected on site.

4.1.3 Ecological Services

The various ecosystem services provided by the historically recorded fauna and likely TOP fauna are typical and include:

- Keystone species (ecologically affect the environment) and flagship / icononic species (socially associated with / designated representatives of specific ecological settings / habitats / biomes).
- Regulator of prey and / or predator numbers.
- Significant prey-base for predators / raptors.
- Control of potential vermin, pests and AI species, including potential vectors for disease.
- Seed dispersal.
- Bulk grazers facilitate new growth and specific feed for more selective grazers.
- Scavengers clean up carrion, remove potential diseases and contribute to nutrient recycling.
- Burrowing species increasing the humic content of soil, aerate soil, and enhance infiltration and the water holding capacity of soil.
- Burrows also traps seeds and create regenerating patches of vegetation.
- Burrows create refugia for other species to live and escape fires.

4.2 Invertebrates

No invertebrate SCCs are listed in the Environmental Screening Tool Report.

No TOP invertebrates were recorded for the relevant QDGS.

No Provincially protected invertebrates were recorded for the QDGS.

Ecological services provided by the invertebrates are too numerous to mention. Some of the more critical services include

- Their enormous biomass makes them a significant food source in the food chain and many species feed exclusively on invertebrates.
- They are significant pollinators and some plants have very unique relationships and are completely dependent on specific invertebrates for their pollination (wild figs and some orchids).
- They are also significant burrowers (termites and ants often form extensive underground tunnels and chambers) and contribute to the various benefits of burrow systems (for example trapping water and seeds, improving soil moisture and organic content).
- Decomposers of all biological matter (including animal matter, plant matter, faecal matter) and therefore significantly contribute to nutrient recycling and the prevention of aquatic / terrestrial eutrophication / nitrification.

Table 2: TOP and Endemic Mammals (SCCs as per the Environmental Screening Tool Report indicated in bold)

Family	Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
TOP and Endemic Species historically recorded within the greater area / QDGS						
Afrosoricida	Mole, Highveld Golden	*Amblysomus septentrionalis*	Endemic		NT	NT
Carnivora	Cat, Black-footed	*Felis nigripes*		PR	VU	VU
Carnivora	Otter, Spotted-necked	*Hydrictis maculicollis*		PR	VU	NT
Carnivora	Serval	*Leptailurus serval*		PR	NT	
Carnivora	Honey Badger (Ratel)	*Mellivora capensis*		PR		
Cetartiodactyla	Wildebeest, Black	*Connochaetes gnou*	Endemic	PR		
Cetartiodactyla	Blesbok	Damaliscus pygargus phillipsi	Endemic		NT	
Cetartiodactyla	Antelope, Sable	Hippotragus niger niger			VU	
Cetartiodactyla	**Oribi**	***Ourebia ourebi***		**EN**	**EN**	
Eulipotyphla	Hedgehog, Southern African	*Atelerix frontalis*		PR	NT	
Rodentia	Mole-rat, Cape	*Georychus capensis*	Endemic			
Likely TOP and Endemic species						
Carnivora	Hyaena, Brown	*Parahyaena brunnea*		PR	NT	NT
Carnivora	Fox, Cape	*Vulpes chama*		PR		
Cetartiodactyla	Reedbuck, Southern	*Redunca arundinum*		PR		
Rodentia	Mole-rat, Pretoria	*Cryptomys pretoriae*	Endemic			
Possible TOP and Endemic Species						
Cetartiodactyla	Rhebok, Grey	*Pelea capreolus*	Endemic		NT	NT
Cetartiodactyla	Reedbuck, Southern Mountain	*Redunca fulvorufula*	Near Endemic		EN	EN
Eulipotyphla	**Shrew, Maquassie Musk**	***Crocidura maquassiensis***			**VU**	
Eulipotyphla	Shrew, Forest	*Myosorex varius*	Endemic			
Lagomorpha	Rabbit, Hewitt's Red Rock	*Pronolagus saundersiae*	Endemic			
Rodentia	Rat, Tete Veld	*Aethomys ineptus*	Possible endemic			
Rodentia	Mouse, White-tailed	*Mystromys albicaudatus*			VU	VU
Unlikely TOP and Endemic Species						
Carnivora	Wild Dog, African	*Lycaon Pictus*		EN	EN	EN

Family	Common name	Scientific name	Endemism	SA GN151	SA Red-list	IUCN
Carnivora	Leopard	*Panthera pardus*		VU	VU	VU
Chiroptera	Bat, Percival's (Short-eared) Trident	*Cloeotis percivali*			EN	
Chiroptera	Bat, Cohen's Horseshoe	*Rhinolophus cohenae*	Endemic		VU	VU
Chiroptera	Bat, Swinny's Horseshoe	*Rhinolophus swinnyi*			VU	
Rodentia	Rat, Robert's Marsh	*Dasymys robertsii*			VU	

CR: Critically Endangered; EN: Endangered; VU: Vulnerable; PR: Protected; NT: Near Threatened

5. Terrestrial Fauna Biodiversity and Species Summaries

This section must be read together with the floral sensitivity plan to ensure a comprehensive terrestrial biodiversity sensitivity plan.

5.1 Terrestrial Biodiversity

Table 3 summarises the terrestrial fauna biodiversity findings as required under the terrestrial biodiversity protocol in addition to the items discussed in Table 1.

Table 3: Terrestrial fauna biodiversity features

Aspect	Fauna findings
Ecological processes	The main ecological process is the plant-based primary production of 'food' through photosynthesis, which also absorbs CO_2 and releases O_2 and forms the principal base of the food-chain in a terrestrial environment. Secondly, the associated contribution to the water cycle through evapotranspiration is also a significant ecological process provided by the plant life. Another important process is that of natural fires, although natural fire cycles in South Africa's grassland and savanna have already been impacted by humans and is not evaluated further.
Ecological drivers: climate change, AIS infestation & habitat changes.	The site appears to be dominated by crop fields and moist grasslands, with scattered patches of aquatic habitats (streams / pans / dams), alien invasive arboreal habitat and man-made infrastructure (roads and farmsteads). The project area is not expected to support significant alien invasive mammals, limited to potential common and widespread rodents associated with human settlements.
Ecological services	No special or critical ecological services provided by fauna were identified for the area and were largely related to the usual services provided by fauna (invertebrate control, prey-base in food chain, pest control, burrowing).
Ecological Corridors	The non-perennial stream on site does not form a significant ecological corridor on site. The receiving stream and floodplains to the north are considered a significant riverine / wetland corridor linking to the Vaal River. The Mpumalanga Highveld Wetland in the eastern third of the development site forms an extensive node to this northern riverine corridor and is also connected to the Vaal River. Although close to its origin and still a young river in this area, the Vaal River becomes a significant regional and provincial river and riverine ecological corridor. The Vaal tributary south-east of site also provides a minor riverine ecological corridor linked to the Vaal River.

5.1.1 Site Sensitivity

In terms of the desktop findings the following is relevant:

- Highly sensitive areas and areas likely to support higher faunal richness or biodiversity in the project area are directly linked to the irreplaceable CBAs on site, with the eastern CBA the potential primary biodiversity hotspot in terms of mammals and invertebrates. In the surrounds, highly sensitive areas incorporate the riverine and associated grassland areas north and towards the Vaal and the Vaal Tributary south east of the project area.

- Moderately sensitive areas currently include the on-site non-perennial stream. Streams and other surface water features are normally considered highly sensitive features due to their legal status under the National Water Act, the fact that they are often form ecological corridors and provide unique habitats within the terrestrial setting (often includes habitat for ecologically significant species). In terms of this specific stream, which does not provide a significant ecological corridor and has limited buffer habitat within the proposed development site, the sensitivity of the habitat is reduced to moderate.
- Areas with low sensitivity include the cleared and developed areas, alien invasive tree stands and areas under crop agriculture.

5.2 Fauna Species

The following is relevant in terms of mammals:

- Of the SCCs:
  - The Oribi has one confirmed record and the project area falls within its distribution range. Active searching will be conducted for this species.
  - The Maquassie Musk Shrew has not been historically or recently recorded in the greater area, even though the project area is within the larger distribution range of the species. A habitat assessment will be completed for the species but it must be understood that there is little conclusive information about the species, and the species is only linked to moist habitats associated with wetlands.
- Five historically recorded TOP species (Black-footed Cat, Spotted-necked Otter, Serval, Honey Badger and Southern African Hedgehog) and three TOP species with distribution over the area (Brown Hyaena, Cape fox and Southern Reedbuck) could occur in the project area as they have wide habitat tolerances or will utilise wetland habitats on site if appropriate cover is available. A habitat assessment (and resource assessment where relevant) will be completed for these species.
- The area is not an area of mammal endemism and no impact is expected to restricted endemic species.

In terms of invertebrates:

- No SCCs were listed in the Environmental Screening Tool Report.
- No TOP species or provincially protected species were recoded in the QDGS relevant to the project area.

5.2.1 Site Ecological Importance

The SEI assessment will be completed once the site evaluation and likelihood of SCCs (and other TOP species) is completed and finalised.

6. Conclusion and Recommendations

6.1 Site Sensitivity

This study, currently at desktop level, focussed on a mammal and invertebrate assessment within the site, with broader overview of the project area. Table 4 summarises the sensitivity ranks reported in the Environmental Screening Tool Report, the desktop evaluation of these sensitivity ranks and the level of reporting that will be completed according to the Protocols for the Assessment and Reporting of Environmental Themes for animal species (GN1150 of 2020) and also considering biodiversity features (GN320 of 2020) of relevance to fauna species.

Table 4: Summary of Site Verification Outcome for terrestrial animal species (Desktop)

Screening Tool Report Sensitivity Rank	Verified Sensitivity (Desktop level only)	Plan of study	Section Motivating Verification
Animal Species – Mammals			
Medium rank for two trigger SCCs	Expected that any natural habitats will become High rank for the SCCs / potential TOP species.	Full Animal Species Specialist Report.	Executive summary for overall summary.
Animal Species – Invertebrates			
Low rank is assumed for invertebrates	Expected to remain Low.	Full Animal Species Specialist Report.	Executive summary for overall summary.
Aquatic Biodiversity – As far as it pertains to terrestrial animal species			
Very high for aquatic CBAs, wetlands and NFEPA sub-catchments	Consult Aquatic Biodiversity Report for final verification. Wetlands and buffer areas in a natural state will rank high in terms of potential sensitive mammal habitat.	Value as habitat and ecological corridor will be incorporated into the Specialist Report.	Executive summary for overall summary.
Terrestrial Biodiversity – As far as it pertains to terrestrial animal species			
Very high for CBA1, NFEPA sub-catchments, NPAES, SWSAs and TOP Ecosystems	Expected to rank high for natural habitats within the CBA1 and NFEPA sub-catchment and possibly the TOP Ecosystems (pending flora findings).	Value as habitat and ecological corridor will be incorporated into the Specialist Report.	Executive summary for overall summary.

6.2 Plan of Study

The plan of study (detailed in Section 2) will incorporate the animal species protocols for Medium Sensitivity Rating and also include discussion of terrestrial and aquatic biodiversity features of relevance to terrestrial fauna. The following will be undertaken:

- A site assessment, by way of meanders within broader habitat units (crops, grasslands, moist grassland, riverine areas and AIS tree stands), will be undertaken after the first rainfalls in the following spring / summer season.

- Survey will focus on the grasslands, moist grasslands and riverine areas which are more likely to host the two trigger SCCs, as well as the suspected TOP species.
- Focusses surveys will be undertaken in the development site with less intensive surveying of the project area and visual assessment of areas beyond where visible.
- Active searching will be completed for the SCCs in appropriate habitat units (or assumed appropriate habitat in terms of data deficient species).

- The current likelihood of SCCs and TOP species occurring on site will be updated based on field assessment findings.
- As SCCs / TOP species are likely on site, the Terrestrial Animal Species Specialist Assessment protocols will be followed and include the following items, where the information can be reasonably gathered:
  - If physically observed and where possible, photographs and the number of SCCs / TOP species observed, including any population information that can be gained during brief sighting with such species.
  - Discussion on the important ecological drivers, processes and services as may be relevant, with focus on those of importance to confirmed or likely SCCs / TOP species.
  - Detailed impact assessment on SCC / TOP species populations, their habitats, and ecological functions that may be important to the survival of local SCCs / TOP species; provide management recommendations to mitigate negative impacts of the activities on terrestrial fauna.
  - Discussion on buffer distances for the SCCs / TOP species where this is relevant to the species in the specific setting.
  - Assess site ecological importance based on site survey findings.

6.3 Opinion and Recommendations

As per the Mpumalanga Biodiversity Conservation Plan Handbook, land use in Irreplaceable CBAs must be in line with Conservation Management as all natural areas are required for the province to meet its biodiversity targets. Extensive game and stock farming may be considered as a land use if regulated under prescribed conditions (Ferrar and Lötter, 2007). Offsets for irreplaceable CBAs will only be considered under exceptional circumstances (Ferrar and Lötter, 2007), although such circumstances are not detailed in the handbook. Therefore, there exists a POTENTIAL fatal flaw which may require amendment to current proposed development and activities and consultation with Mpumalanga Parks and Tourism Agency as to the proposed development and potential for offset areas.

The following recommendations are relevant at this stage:

- The Mpumalanga Parks and Tourism Agency must be consulted as soon as possible in terms of the proposed development.
- The field assessment must be completed and this report updated with findings as per the plan of study.
- The rehabilitation plan must be drafted as part of the environmental management programme (EMP).
- The development is likely to contribute to the exacerbation of existing AI species, which must be managed on site in line with the municipal alien invasive management strategy (where one is in place).

- The development will contribute to increased risk of contaminated and silt-loaded runoff. This could enter the natural streams during heavy rainfalls and activities must be managed to reduce the risk of such impacts. Preliminary plans to manage storm water runoff and contain and treat of contaminated water must be submitted with the EMP.

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7.2 Internet Sources

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- iucnredlist.org: For the IUCN Red List status of species.
- SANBI.org.za: For species status and geographic information related to protected and sensitive ecosystems and environments, such as National Freshwater Priority Areas (NFEPA), Fish Sanctuaries and important catchments under NFEPA, Biodiversity and Conservation Plans, Important Bird Areas (IBA).
- saramsar.com: For information on SA RAMSAR sites
- vmus.adu.org.za/: Animal Demography Unit, Virtual Museum:
  - FitzPatrick Institute of African Ornithology (2022). FrogMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=FrogMAP on 2022-07-04.
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- whc.unesco.org: for information on SA World Heritage Sites

Appendix A: CV, Qualification, SACNASP registration

Curriculum Vitae: BARBARA KASL

- 2010 – current: SACNASP Professional Environmental and Ecological Scientist
- 1999, 2001 & 2008 – current: Entomological Society of South Africa
- E-mail: bk.zoology@gmail.com;

Tertiary Education

University of the Witwatersrand

- 2002-2004: PhD (Animal, Plant and Environmental Sciences)
- 1999-2001: MSc (upgraded to PhD)
- 1998: B.Sc. Hon. (Zoology and Botany)
- 1995-1998: BSc (Zoology and Botany)

Professional Experience – ±15 years

02/2017 – Current: Self-employed as fauna specialist & environmental consultant

- Fauna impact assessments and management plans.
- Fauna assessment / input into a variety of environmental projects (SOE, EMPr, EMFs)
- Environmental consulting.

01/2008 – 02/2017: CABANGA CONCEPTS:

- Environmental Scientist / Principal Consultant & shareholder in Cabanga Concepts.
- Overall project manager and principal report reviewer.
- Experience with World Bank Standards, IFC Equator Principals.
- Compilation of various environmental applications and documents, including various audit reports.
- Stay current with environmental legislation and standards and norms.
- Review and comment on draft environmental legislation related to environmental sector.

09/2004 – 11/2007: DIGBY WELLS & ASSOCIATES (DIGBY WELLS ENVIRONMENTAL)

- Unit Manager for the Ecology Unit including management of a flora and wetland specialist.
- Acting Department Head and management of the Biophysical Department which included the Ecology Unit and Atmospheric Environment Unit.
- Responsible in completion of fauna assessments and managing ecological projects.
- Various South African and African environmental application and management projects.

Other Professional activities (details can be provided on request)

Mentorship programmes & tutelage

- Field-based tutelage to young professional zoologists.
- High level mentor in the MISA Mentorship Programme for SACNASP candidates.

Participation in legislative processes

- Review and comment on the alien invasive species legislation.

- Review and comment on the environmental themes legislation, specifically the terrestrial biodiversity and animal species protocols and associated guidelines.

Courses / Workshops / Conferences

- February 2022: SANBI Animal Species Guidelines Webinar: Invertebrate Focus Group
- December 2021: South African Science Forum. Attended.
- May 2020: IAIA Species Environmental Assessment Guideline: Webinar for the introduction of the SANBI species assessment guidelines for the animal and plant species protocols. 21 May 2020
- December 2018: South African Science Forum. Attended.
- December 2017: South African Science Forum. Attended.
- April 2017:Alien invasive species identification and management.
- June 2014: Waste Management Law Workshop.
- October 2010: NEM: Air Quality Act Workshop.
- August 2009: NEMA and NEMWA Workshop.
- November 2007: Environmental Impact Assessment Training.
- February/March 2007: Project Management.
- September 2006: Introduction to Managing Environmental Water Quality.
- September 2005: Non-credited course in River health and SASS5.
- May 2005: Snake Identification and Snakebite Treatment Course.
- July 2001: Entomological Society of Southern Africa (2-5 July 2001) Attended & presented talk.
- July 1999: Entomological Society of Southern Africa Conference (12-15 July 1999) Attended & presented poster
- July 1998: Zoological Society of Southern Africa Conference (6-10 July 1998) Attended & presented poster.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Barbara Kasl

Registration Number: 400257/09

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)
Environmental Science (Professional Natural Scientist)

Effective **11 November 2009** Expires **31 March 2023**

Botha
Chairperson

Chief Executive Officer

To verify this certificate scan this code

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

At a congregation of the University

held on 25 November 2004

Barbara Kasl

was admitted to the Degree of

Doctor of Philosophy

AFRIKAANSE POLISIEDIENS
KLIËNTE DIENS SENTRUM
2010 -03- 22
SOUTH AFRICAN POLICE SERVICE

Dean, Faculty of Science

Vice-Chancellor and Principal

Registrar

Appendix B: Desktop mammal records (mainly from ADU, iNaturalist & Mpumalanga Parks and Tourism QDGS Data)

Family	Common name	Taxon name
Afrosoricida	Mole, Highveld Golden	*Amblysomus septentrionalis*
Carnivora	Otter, Cape Clawless	*Aonyx capensis*
Carnivora	Jackal, Black-backed	*Canis mesomelas*
Carnivora	Mongoose, Yellow	*Cynictis penicillata*
Carnivora	Cat, Black-footed	*Felis nigripes*
Carnivora	Mongoose, Slender	*Herpestes sanguineus*
Carnivora	Otter, Spotted-necked	*Hydrictis maculicollis*
Carnivora	Polecat, Striped (Zorilla)	*Ictonyx Striatus*
Carnivora	Serval	*Leptailurus serval*
Carnivora	Honey Badger (Ratel)	*Mellivora capensis*
Carnivora	Weasel, African Striped	*Poecilogale albinucha*
Carnivora	Aardwolf	*Proteles cristata*
Carnivora	Suricate (Meerkat)	*Suricata suricatta*
Cetartiodactyla	Springbok	*Antidorcas marsupialis*
Cetartiodactyla	Wildebeest, Black	*Connochaetes gnou*
Cetartiodactyla	Blesbok	*Damaliscus pygargus phillipsi*
Cetartiodactyla	Antelope, Sable	*Hippotragus niger niger*
Cetartiodactyla	Oribi	*Ourebia ourebi*
Cetartiodactyla	Duiker, Common	*Sylvicapra grimmia*
Eulipotyphla	Hedgehog, Southern African	*Atelerix frontalis*
Hyracoidae	Hyrax, Rock (Dassie)	*Procavia capensis*
Lagomorpha	Hare, Savanna	*Lepus victoriae*
Perissodactyla	Zebra, Plains	*Equus quagga*
Primata	Monkey, Vervet	*Chlorocebus pygerythrus*
Primata	Baboon, Chacma	*Papio ursinus*
Rodentia	Mole-rat, Cape	*Georychus capensis*
Rodentia	Porcupine, Cape	*Hystrix africaeaustralis*