Proposed Construction of Bafokeng-Ararat 88kV Powerline, North-West Province.

Terrestrial Ecological Impact Assessment Report

MBONENI
ECOLOGICAL SERVICES

Prepared For:	**Prepared By**:
Humba Environmental Consultancy Mr. Tinashe Maramba 212 South Street 8415 Riverside Place Centurion Pretoria Cell Phone: 072 309 0502 Email: tinashe@humba.org	Avhafarei Phamphe Mboneni Ecological Services 5 5th Street Linden Johannesburg Cell Number: 082 783 6724 Email: Mboneni.Phamphe@gmail.com

October 2021

Executive Summary

Introduction and Background

Eskom's Bafokeng 7 substation currently has two (2) transformers that supply electricity to Impala platinum mine. Eskom proposes to add a 3rd transformer at Eskom Bafokeng 7 substation for Impala Platinum mine by reducing electricity load at Millennium Substation which feeds Millennium mine and increasing/taking it to Bafokeng 7 substation which will supply more electricity load for Impala Platinum mine.

The scope of work for this project entails then,

1. the installation of a new 40MVA 88/33kV transformer at Eskom Bafokeng 7 substation; and
2. the splitting of the 2xSycamore 88kV lines that are entering the Bafokeng 7 88/33kV substation and the 2xSycamore 88kV lines that are also leaving the Eskom Ararat Main Transmission Substation (MTS), so as to increase a load for Impala Platinum mine while maintaining a firm supply at Eskom's Millennium 88/33/6.6kV substation by shifting load from the Millennium point of supply to Eskom's Bafokeng 7 substation.

In addition, Eskom Bafokeng 7 substation supplies the local townships of Mogono and Ga-Luka. The Ararat MTS supplies local substations like Minpro, SA Chrome, Millennium, Impala Platinum, Phokeng, Wildeplats and Bafokeng 7.

A Terrestrial Ecological Impact Assessment was undertaken by Mboneni Ecological Services (Pty) Ltd as part of the Environmental Impact Assessment (EIA) process in order to assess the impacts that the proposed development will have on the receiving environment. The objective of this study was to identify sensitive species and their habitats on the project sites. The current ecological status and conservation priority of vegetation on sites were assessed. Potential faunal habitats were investigated in the project sites and all mammals, birds, reptiles and amphibians known to occur or seen on sites were recorded.

Study Area

The project is divided into two sites, namely Ararat and Bafokeng sites. Ararat site is situated on portion 2 of Farm Kookfontein 265JQ and Bafokeng site is found on Remainder of Farm Doornspruit 106JQ, in Rustenburg Local Municipality, Bojanala District Municipality, North West province. The Ararat site has two alternative route options, which are Alternative Route A and Alternative Route B, whilst Bafokeng site has only one proposed route, with no alternative route. The proposed routes have been assigned a 100m wide corridor.

Regional Vegetation

The entire project area falls within the Savanna Biome and this Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants. This biome is defined by a herbaceous layer dominated by grass species and a discontinuous to sometimes very open tree layer.

The Ararat site falls within the Endangered Marikana Thornveld vegetation type, whereas Bafokeng site falls within the Zeerust Thornveld vegetation type, listed as Least Threatened.

Terrestrial Threatened Ecosystems

"Ecosystem protection level" is an indicator of how adequately an ecosystem is protected or not. Ecosystems can be classified as not protected, poorly protected, moderately protected or well protected depending on the proportion of each ecosystem that is under conservation management within a protected area, as recognized in the National Environmental Management: Protected Areas Act (Act 57 of 2003) –these protected areas include state or privately-owned protected areas as well a land under biodiversity stewardship agreements.

According to SANBI (2011) Threatened Ecosystems, only the Ararat site falls within the *Vulnerable* Marikana Thornveld threatened ecosystem. However, according to the National Biodiversity Assessment (2018), the project area falls within the threatened ecosystem, which is **Poorly Protected** on a national scale.

North West Biodiversity Sector Plan

In 2015, the Department of Agriculture, Conservation, Environment and Rural Development in the North West province developed the North West Biodiversity Sector Plan (NWBSP). In essence, the NWBSP is a map guiding areas of conservation concern for the North West Province. Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBA is to inform land-use planning and the land-use guidelines attached to CBA's aim to promote sustainable development by avoiding loss or degradation of important natural habitat and landscapes in these areas and the landscape as a whole. CBA's can also be used to inform protected area expansion and development plans. The two sites (Ararat and Bafokeng) do not fall within any of the CBAs and Ecological Support Areas (ESAs).

Methodology

Survey methodology included a comprehensive desktop review, utilising available provincial and national ecological data, relevant literature, GIS databases, topographical maps and aerial photography. This was then supplemented through a ground-truthing phase, where pertinent areas associated with the project area were visited during field survey undertaken on 26 July 2021. The survey focused on flora (vegetation) and fauna (mammals, avifauna, reptiles and amphibians). Several Red Listed Data floral and faunal species pertaining to the project area were identified during the desktop review and their habitat suitability were assessed through the ground-truthing phase of the survey.

Results and Discussion – Flora

During the field survey, no threatened plant species were observed on the project sites. The Ararat site is situated in an area which is less disturbed but dominated by highly invasive *Dichrostachys cinerea* (Sicklebush), whereas Bafokeng site is dominated with anthropogenic activities such as illegal dumping of materials and surrounded by human settlements. Plant species such as *Aloe davyana, Ehretia rigida* subsp*. nervifolia* and *Vachellia karroo* were found on both sites. The graminoid layer was dominated by *Themeda triandra* and *Cynodon dactylon.* The vegetation composition and relatively low species diversity in these habitat units are typical of the Marikana Thornveld and Zeerust Thornveld vegetation types and the low diversity are results of disturbance or transformation. Newly cleared soils will have to be re-vegetated and stabilised as soon as construction activities have been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging alien invasive plant species. The rehabilitation of disturbed areas should receive high priority and the plant species used during rehabilitation should be site specific and according to the surrounding vegetation composition. All development footprint areas should remain as small as possible and should not encroach onto surrounding areas.

Results and Discussion – Fauna

Habitat transformation due to the existing human settlements has negatively impacted on mammal occurrence, especially on Bafokeng site. Most sections of the project sites in their present state are not considered optimal habitat for larger mammal species due to hunting by locals. Three mammal species recorded during the survey, namely Common Mole-rat, House mouse and Four-striped Grass Mouse. No mammal SCC were recorded during the survey. The low mammal diversity was attributed to the transformed nature of the surrounding area, as well as the relatively high human density in the areas surrounding the project area. Continual habitat destruction, alteration and human disturbances results in the disappearance of the sensitive or secretive mammal species.

The Important Bird and Biodiversity Areas (IBA) Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types. The project sites do not fall within any of the IBAs and the nearest IBAs are *Magaliesberg*, situated approximately 9km, south of Ararat site and Pilanesberg National park, situated approximately17km north Bafokeng site.

Although all birds have the potential to be affected by collisions, species groups most at risk of collision impacts are those with heavier bodies and relatively small wingspan, making them less movable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese. Another group of birds that are known to migrate at night are flamingos. Both the Greater flamingo (*Phoenicopterus ruber*) and Lesser flamingo (*Phoenicopterus minor*) have been recorded from the region.

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap

between live components and/or live and earthed components. Electrocution risk is strongly influenced by the power line voltage of the and design of the pole structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks. Although electrocutions are possible on the 88kV power line infrastructure, it is assumed that the proposed project will be constructed using the standard Eskom steel monopole structure type, with the standard bird perch.

Habitat destruction and alteration will take place during the construction phase of power lines, and this happens with the clearing of the site itself and any associated infrastructures. The servitude also has to be maintained free of any natural vegetation, amongst other reasons to minimize the risk of fire. The destruction or alteration of natural habitat has an impact on birds breeding, foraging and roosting in close proximity to the site.

The bushveld and dwellings provide suitable habitats for reptile species to occur on the project area. The project sites area support limited suitable habitat for any arboreal species but provided suitable habitat for terrestrial reptile species. Termite mounds were present on site and old termite mounds offer important refuges especially during veld fires as well as cold winter months for numerous snake species. No termite mounds were destroyed during the brief field survey. All overturned rock material was carefully replaced in its original position. Only two reptile species were recorded during the survey, namely Distant's Ground Agama (*Agama aculeata distanti*) and Speckled Rock Skink (*Trachylepis punctatissima*). No reptile Species of Conservation Concern were recorded on the project development sites. According to the anecdotal information, Brown House Snake (*Boaedon capensis*) has been seen on site. This reptile species is known to frequent human dwellings where it feeds on rodents or lizards. It is widespread in South Africa and very common in suburban gardens.

The non-perennial watercourse within the Ararat site area holds water on a temporary basis and are important breeding habitat for most of the frog species which could occur within the project sites. During the field survey, no frog species were recorded on the project site. However, frog species such as Guttural Toad (*Sclerophrys gutturalis*), Bubbling Kassina (*Kassina senegalensis*) and Common Platanna (*Xenopus laevis*) have been recorded in abundance in the region. The only Species of Conservation Concern which is known to occur in the region is the Giant Bullfrog, which usually breeds within the Grassland biome, but also has been shown to breed within savanna wetlands. It is is known to breed in seasonal shallow grassy pans, vleis and other rain filled depressions in open flat areas of grassland or savanna. They are explosive breeding frogs which utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. The project area does not offer any suitable habitat for this species to occur. According to the International Union for Conservation of Nature (IUCN) Red List category, this species is currently assigned a Near-Threatened status. Globally, it is listed as Least Concern. According to National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) *Threatened or Protected Species*, this species is listed as *protected*. No suitable habitat for this species occurs on the project site, however,

should this species be found during construction, the necessary permits should be acquired from North West - Department of Agriculture, Conservation, Environment and Rural Development (NWDACERD) and any Giant Bullfrogs present on the site, should be re-located to adjacent areas with suitable habitats.

Conclusion and Recommendations

Generally, the development activities proposed within the project sites will not have a significant impact on biodiversity conservation within the region, provided that appropriate mitigations measures are implemented. It is the opinion of the ecologist, that the proposed development be considered favourably, provided that the mitigations measures are implemented and adhered to. The methodologies used and results found during the field survey, together with the impacts and mitigation measures provide confidence that the project can go ahead. At Ararat, the Alternative Route A is the preferred route as it is the shortest route (approximately 244.32m), which will lead to less clearing of natural/indigenous vegetation as compared to Alternative Route B (which is approximately 574.83m). There is no alternative route for the Bafokeng site and this site is situated in an area which is highly disturbed and fragmented, with little to no ecological significance.

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List of Abbreviations

ADU	Animal Demography Unit
AIPs	Alien Invasive Plant species
BODATSA	Botanical Database of Southern Africa
CBAs	Critical Biodiversity Areas
CARA	Conservation of Agricultural Resources Act
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESAs	Ecological Support Areas
GPS	Global Positioning System
GIS	Geographic information system
QDS	Quarter degree Squares
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
NBA	National Biodiversity Assessment
NWBSP	North West Biodiversity Sector Plan
NEMA	National Environmental Management Act
PRECIS	Pretoria Computer Information Systems
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SARCA	Southern African Reptile Conservation Assessment
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species

1 PROJECT OVERVIEW AND BACKGROUND

Eskom's Bafokeng 7 substation currently has two (2) transformers that supply electricity to Impala platinum mine. Eskom proposes to add a 3rd transformer at Eskom Bafokeng 7 substation for Impala Platinum mine by reducing electricity load at Millennium Substation which feeds Millennium mine and increasing/taking it to Bafokeng 7 substation which will supply more electricity load for Impala Platinum mine.

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2 STUDY AREA

The proposed project will be in the Rustenburg Local Municipality (RLM) under the magisterial municipal district of Bojanala Platinum (BPDM). Ararat MTS is approximately 4km due north-east of Phokeng town, capital of the Royal Bafokeng Nation. Bafokeng 7 substation is located between the Ga-Luka and Magono townships, Rustenburg. Ararat MTS is approximately 7.5km due south of Bafokeng 7 substation.

The project is divided into two sites, namely Ararat (**Figure 1**) and Bafokeng (**Figure 2**) sites. Ararat site is situated on portion 2 of Farm Kookfontein 265JQ and the Bafokeng site is situated on Remainder of Farm Doornspruit 106JQ, in Rustenburg Local Municipality, Bojanala District Municipality, North West province (**Figure 3**). The proposed routes have been assigned a 100m wide corridor. A collage of photographs taken on the project sites is indicated in **Figures 4, 5** and **6.**

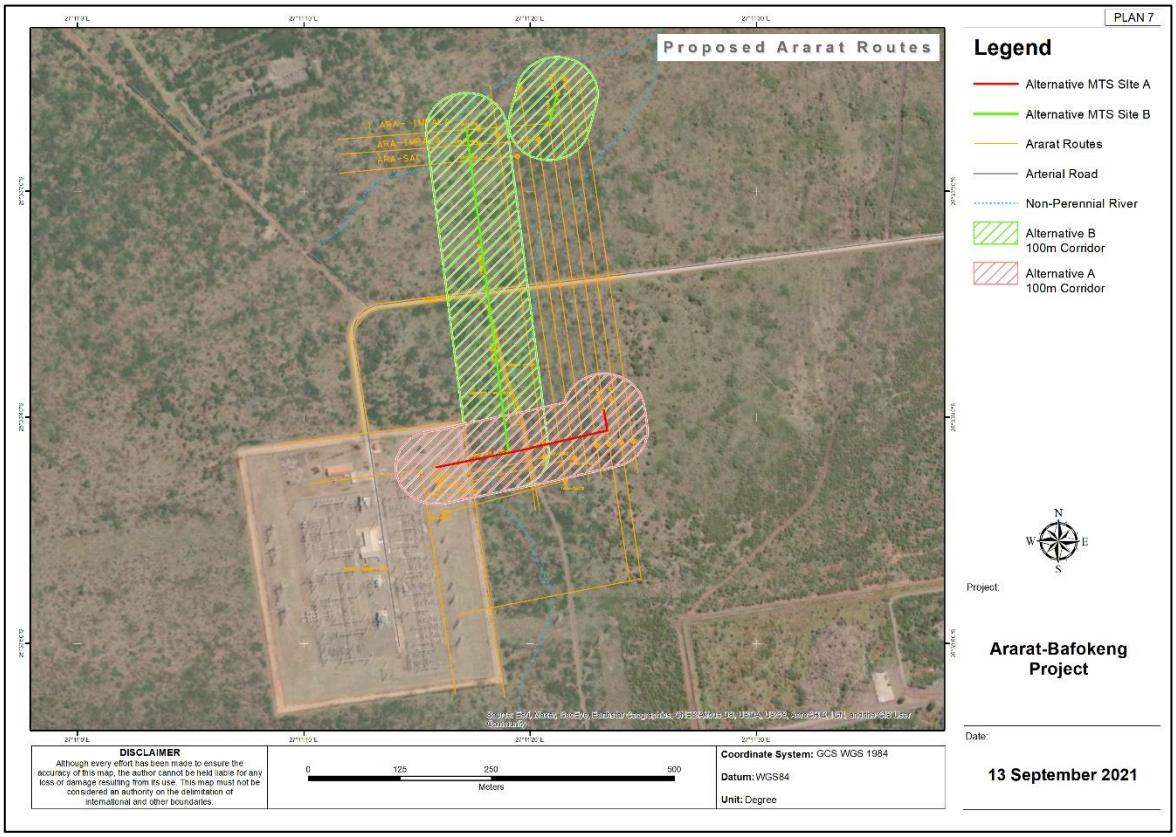

Figure 1. Ararat Alternative routes Map

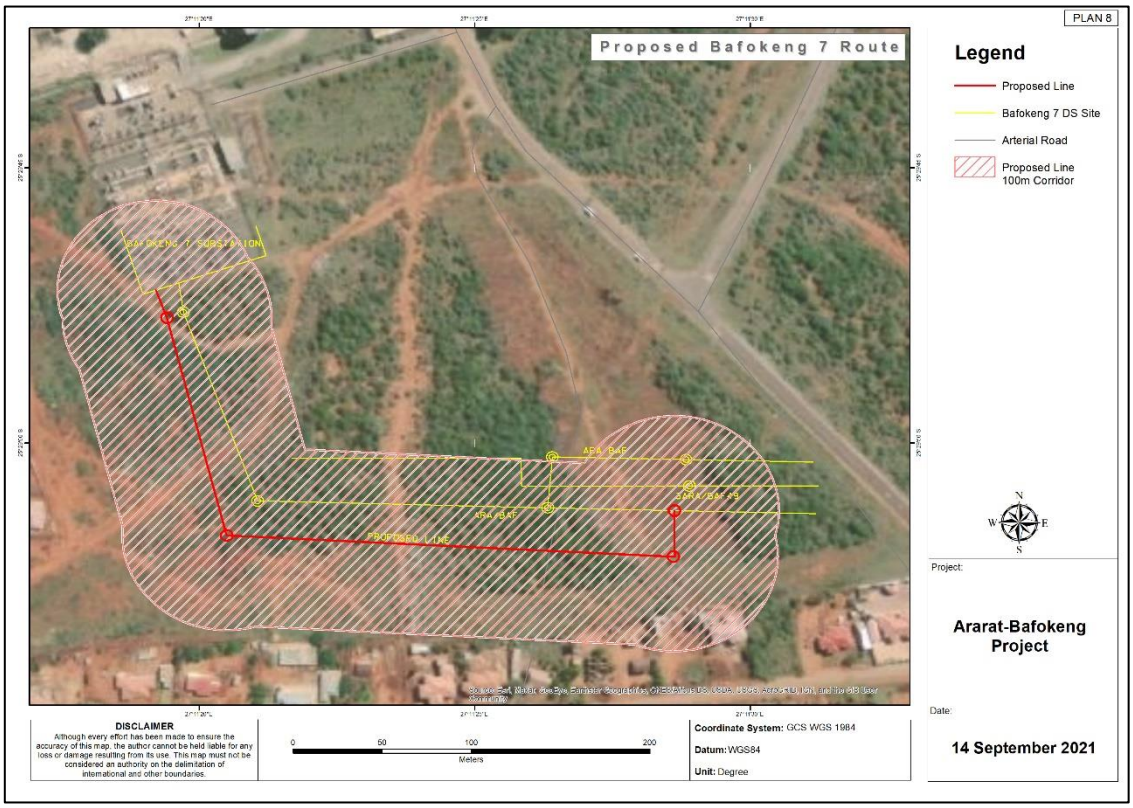

Figure 2. Bafokeng proposed line Map

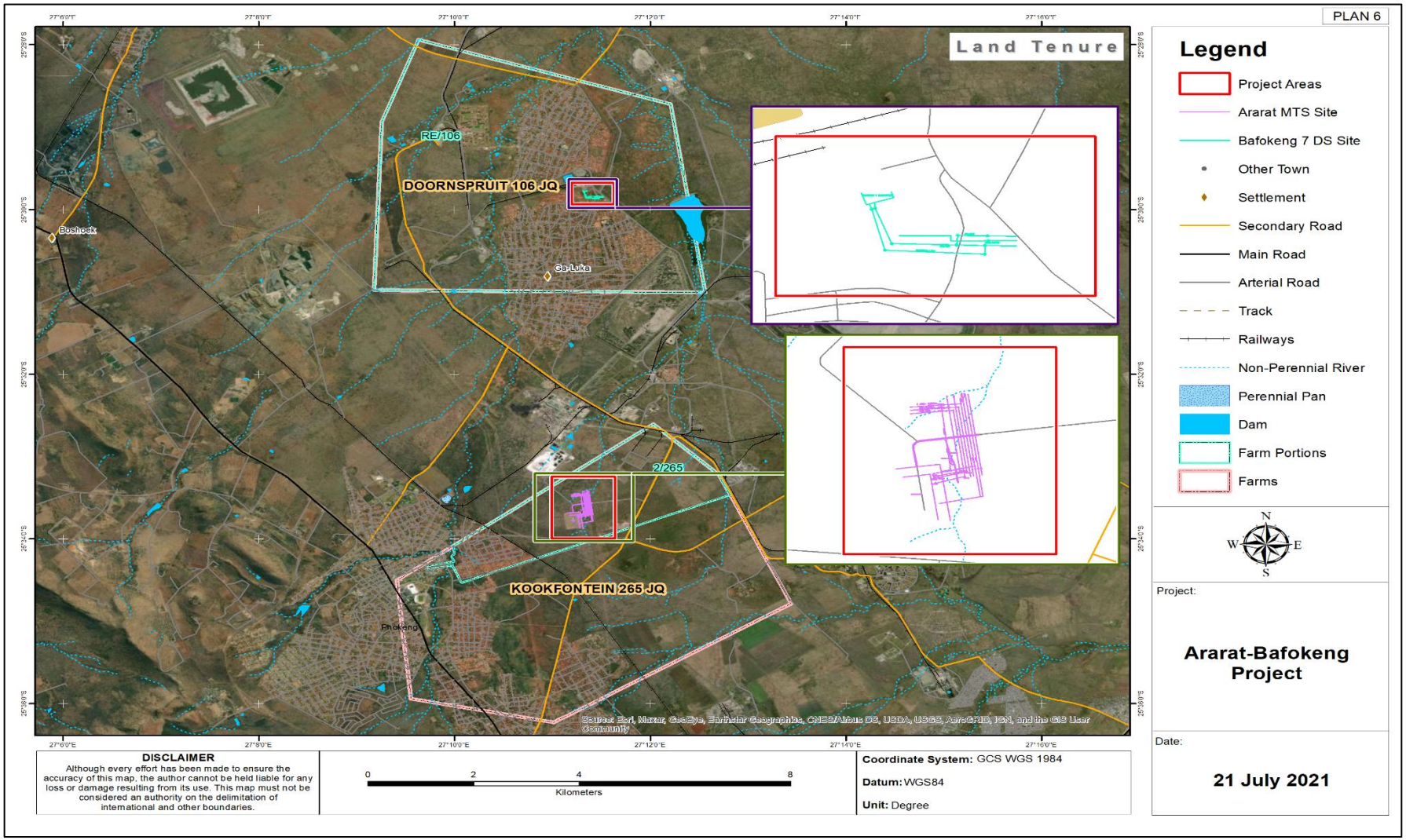

Figure 3. Locality map of the project sites

Figure 4. Collage of photographs taken within the Ararat site (Alternative Route A)

Figure 5. Collage of photographs taken within the Ararat site (Alternative Route B)

Figure 6. Collage of photographs taken within the Bafokeng proposed site

2.1 Objectives of the assessment

- To review literature in order to determine the diversity and eco-status of the plants, mammals, birds, reptiles and amphibians on or near the project sites;
- To carry out a survey to gain an understanding of the diversity of taxa which inhabit the development footprint (project sites), as well as the presence of unique habitats that might require further investigation or protection;
- To assess the current habitat condition and conservation status of plants and animals' species on the project sites;
- To comment on ecological sensitive species/areas;
- To assess the potential impacts that the proposed development may have on plants and animals on the project sites;
- To list the species on site and to recommend necessary actions in case of the occurrence of endangered, vulnerable or rare species or protected trees or provincially protected plants or any Species of Conservation Concern; and
- To provide management recommendations to mitigate negative and enhance positive impacts on the project sites.

2.2 Declaration

I, Avhafarei Phamphe, declare that I –

- act as the independent specialist;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the Applicant and there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake that the report adheres to Appendix 6 of GN No. R 982 of 4 December 2014 (as amended), and
- will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the Applicant or not.

Avhafarei Phamphe:

- Holds a M. Sc in Botany from the University of the Pretoria;
- Is a registered South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist in Ecological Science (Pr.Sci.Nat) Registration No.: 400349/12 , with expertise in floral and faunal ecology;
- Has been actively involved in the environmental consultancy field for over 17 years;
- Is a Professional Member of South African Institute of Ecologists and Environmental Scientists (SAIEES) and
- Is a member of the South African Association of Botanists (SAAB).

Avhafarei Phamphe

Name of Specialist

Mboneni Ecological Services (Pty) Ltd

Name of Company

13 October 2021

Date

Signature

2.3 Terms of reference

- Undertaken a site assessment of the project sites provided, identifying and mapping all relevant environmental sensitivities and features;
- Compile Specialist report inclusive of Impact Assessment, ensuring compliance with the requirements of the 2014 EIA Regulations, as amended; and
- Report must meet the requirements of Appendix 6 of the 2014 EIA Regulations, as amended, and the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (GN 320 of 20 March 2020).

3 RELEVANT LEGISLATION AND GUIDELINES

The legislations that have possible bearing on the proposed project development from an ecological perspective are captured below:

- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- Occupational Health & Safety Act (Act No. 85 of 1993);
- The Constitution (Act 108 of 1996)–Section 24;
- National Environmental Management Act (Act No. 107 of 1998);
- The white paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- The National Environmental Management Act (NEMA) No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 as amended. Specifically, the requirements of the specialist report as per the requirements of Appendix 6;
- National Forests Act (Act 84 of 1998);
- National Environmental Management Protected Areas Act 2003 (Act No 57 of 2003);
- National Environmental Management: Biodiversity Act (Act No.10 of 2004);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened or Protected Species regulations;
- Guidelines for Involving Specialists in the EIA Processes Series (2005).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014;
- North West Biodiversity. Sector Plan (2015); and
- National Biodiversity Assessment (2018).

4 LIMITATIONS AND GAPS

The following constraints/limitations were applicable to this assessment:

- The majority of threatened plant species are seasonal and only flower during specific periods of the year. Time constraints did not allow for repeated sampling over different seasons and so desktop surveys were used to provide additional information based on the current state of the receiving environment.
- The field survey was conducted in July 2021 which does not cover optimal time of the year to find animals such as amphibians and reptiles as well as habitat sensitive plant species of high conservation priority. However, the timing of the site visit is not seen to pose a constraint on the results of the study and it is unlikely that any more visits would reveal information that would change the outcome of this

assessment both in terms of ecosystems of special conservation concern or suitable habitats of species of particular conservation concern. A site visit which was conducted therefore appear to be sufficient to address the objectives of this study.

- Weather conditions during the survey was favourable for recording both fauna and flora.
- The focus of the survey remains a habitat survey that concentrates on the possibility that species of particular conservation priority occur on the site or not.
- While assessment of the potential occurrence of SCC has been undertaken, and is informed by readily available information, this provides only a surrogate indicator of the likelihood of such species occurring. This is however regarded as appropriate given the level of habitat degradation/transformation across much of the project area.
- Data collection in this study relied heavily on data from representative, homogenous sections of vegetation units, as well as general observations, analysis of satellite imagery from the past until the present, generic data and a desktop analysis.
- The potential of future similar developments in the same geographical area, which could lead to cumulative impacts cannot be meaningfully anticipated.
- The impact descriptions and assessment are based on the author's understanding of the proposed development based on the site visit and information provided.
- Since ecological impact studies deal with dynamic natural systems additional information may come to light at a later stage and this Specialist can thus not accept responsibility for conclusions and mitigation measures made in good faith-based information gathered or databases consulted at the time of the investigation

5 METHODOLOGY

5.1 Flora

The flora assessment consisted of two complementary approaches:

- A desktop analysis, which included literature review, local knowledge, topographical maps, and Google Earth imagery; and
- A site visit conducted on 26 July 2021.

Satellite imagery of the area was obtained from Google Earth and was studied in order to acquire a three-dimensional impression of the topography and land use and also to identify

potential “hot-spots” or specialized habitats such as rivers and natural vegetation on or near the project sites.

The computerized data storage and retrieval system, called the Botanical Database of Southern Africa (BODATSA) was consulted to retrieve a list of Red Data plants recorded from the 2527AC and 2527CA Quarter Degree Squares (QDS) http://posa.sanbi.org/searchspp.php). This list was used to determine which Red Data plant species could potentially occur on the project sites. Version 2020 of the Red List of South African plants (http://redlist.sanbi.org/index.php), which is managed as part of SANBI’s Threatened Species Programme, was consulted for the current conservation status of each species in the above list. The term “Species of Conservation Concern” (SCC) as defined by Raimondo *et al.* (2009) was followed in this report, namely all species classified as threatened (Critically Endangered, Endangered and Vulnerable), as well as species classified as Near Threatened, Critically Rare and Rare.

The vegetation map published by Mucina and Rutherford (2018) was also consulted to identify vegetation types that are found in the project sites.

The project sites were traversed on foot and species listed as they were encountered. Attention was paid to the occurrence of medicinal, Red data plant species, protected trees, alien invasive and declared weed species. Field guides such as van Wyk *et al.* (1997), Pooley (1998), van Oudshoorn (1999) and Manning (2009) were consulted during the field work to aid in the identification of plant species.

Regulations published for the National Forests Act (Act 84 of 1998) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study sites and habitat requirements that may be met by available habitat in the project sites. The distributions of species on this list were obtained from published sources (e.g., van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (http://sibis.sanbi.org/) for the quarter degree grid in which species have been previously recorded.

Alien Invasive plant species are controlled by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) List, 2016 (and the latest revised edition of 2019-02-13) was consulted. The AIS Regulations list different categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa.

Alien Invasive plant species are divided into four categories, namely:

- Category 1a: Invasive species which must be combatted and eradicated. Any form of trade or planting is strictly prohibited.
- Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form or trade or planting is strictly prohibited.
- Category 2: Invasive species, or species deemed to be potentially invasive, in which a permit is required to carry out a restricted activity. Category 2 species include commercially important species such as pine, wattle and gum trees.
- Category 3: Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade, is however prohibited.

5.2 Mammals

The Animal Demographic Unit (ADU) website, South African National Biodiversity Institute (SANBI) and Skinner & Chaminda (2005) were consulted in order to draw up a list of mammal species potentially occurring on the project sites.

During the site visit, mammals were identified by spoor, burrows and visual sightings through random transect walks and documented. The habitat quality and quantity for Red Listed species potentially present were evaluated. The adjoining properties (approximately 50m) were also scanned for the presence of Red Listed mammal species/habitat. The confirmed list of presences was augmented with anecdotal information provided by the local community residing in the vicinity of the project sites.

5.3 Avifauna

The online databases of the Southern African Bird Atlas Project (SABAP 2) and *Mybirdpatch* were consulted as a means to determine which Red Listed bird species were previously recorded from the area.

During the site visit, this list was audited based on confirmed sightings of Red Listed bird species and the evaluation of suitable habitat for Red Listed bird species potentially present.

The project sites, including the adjoining properties within 50 m from the project sites, were surveyed on foot (and also using a vehicle) during random transect walks and all sightings were documented.

Birds were identified through visual identification by using a 10 x 50 Voyager binocular, by call, and from feathers. Where necessary, identifications were verified using field guides such as Sasol birds of Southern Africa (Sinclair *et al.* 2002) and the Chamberlain Guide to Birding Gauteng (Marais & Peacock, 2008).

5.4 Reptiles

The ADU website, SANBI and historic distributions (Alexander & Marais, 2007) of reptile species were consulted in order to draw up list of potential occurrences. During site visit, reptiles were identified by visual sightings during random transect walks. Possible reptile retreats such as burrows were inspected for any inhabitants. The habitat quality and quantity for Red Listed species potentially present were evaluated. The adjoining properties (approximately 50 m) were also scanned for sensitive reptile species and habitats. The list of confirmed presences was augmented with anecdotal information provided by the local community residing in the vicinity of the project sites.

5.5 Amphibians

FitzPatrick Institute of African Ornithology (2021), the South African Frog Atlas Project (SAFAP) (1999-2003) data and du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences. Field visit was then undertaken/conducted in order to document all observed frog species. Potential habitat for Red Listed frog species which were previously recorded in the project sites were then identified. Habitat quality and quantity for Red Listed species potentially present were then evaluated. This was then augmented with anecdotal evidence provided by locals. Adjoining properties (approximately 50m) were also scanned for important frog species. Samplings were conducted on the moist to semi-aquatic areas. Suitable habitats such as ephemeral wetlands where amphibian species of conservation such as Bullfrogs occur were also investigated. Frog calls were compared with pre-recorded calls from du Preez and Carruthers (2009)'s CD and identified from this comparison.

6 NORTH WEST BIODIVERSITY SECTOR PLAN

The North West Province's biodiversity provides an important basis for economic growth and development, in ways such as providing rangelands that support commercial and subsistence farming, horticulture and agriculture industry based on indigenous species, tourism industry, aspects of film industry, commercial and non-commercial medicinal applications of indigenous resources, and provision of clean water (NWREAD, 2015).

In 2015, the Department of Agriculture, Conservation, Environment and Rural Development in the North West province developed the North West Biodiversity Sector Plan (NWBSP). In essence, the NWBSP is a map guiding areas of conservation concern for the North West Province.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (Anon, 2008). The primary purpose of CBA is to inform land-use planning and the land-use guidelines attached to CBA's aim to promote sustainable development by avoiding loss or degradation of important natural habitat and landscapes in these areas and the landscape as a whole. CBA's can also be used to inform protected area expansion and development plans. The use of CBA's here follows the definition laid out in the guideline for publishing bioregional plans (Anon, 2008):

- CBAs are areas of the landscape that need to be maintained in a natural or near natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.
- Ecological support areas (ESAs) are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.

If the site is verified as a CBA 1, CBA 2, ESA 1 and/or ESA 2, land development applications other than the preferred biodiversity-compatible land uses (**Table 1)** should be investigated.

Table 1. Biodiversity-compatible land uses.

CBA Map Category	Land Management Objective
Critical Biodiversity Area 1 (CBA 1)	Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process: • Ecosystems and species fully or largely intact and undisturbed. • These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met. • These are biodiversity features that are at, or beyond, their limits of acceptable change.
Critical Biodiversity Area 2 (CBA 2)	Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process: • Ecosystems and species fully or largely intact and undisturbed. • • Areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options • for loss of some components of biodiversity in these landscapes without compromising the ability to achieve • biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs.

CBA Map Category	Land Management Objective
	• These are biodiversity features that are approaching but have not passed their limits of acceptable change
Ecological Support Area 1 (ESA 1)	Maintain in at least a semi-natural state as ecologically functional landscapes that retain basic natural attributes: • Ecosystem still in a natural, near-natural state or semi-natural state, and has not been previously developed. • Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. • Individual species or other biodiversity indicators may be severely disturbed or reduced. • These are areas with low irreplaceability with respect to biodiversity pattern targets only
Ecological Support Area 2 (ESA 2)	Maintain as much ecological functionality as possible (generally these areas have been substantially modified): • Maintain current land use or restore area to a natural state. • Ecosystem NOT in a natural or near-natural state, and has been previously developed (e.g. ploughed). • Ecosystems significantly disturbed but still able to maintain some ecological functionality. • Individual species or other biodiversity indicators are severely disturbed or reduced and these are areas that have low • irreplaceability with respect to biodiversity pattern targets only. • These are areas with low irreplaceability with respect to biodiversity pattern targets only. These areas are required to • maintain ecological processes especially landscape connectivity.

The two proposed sites (Ararat and Bafokeng) do not fall within any of the terrestrial CBAs and ESAs (**Figure 7**).

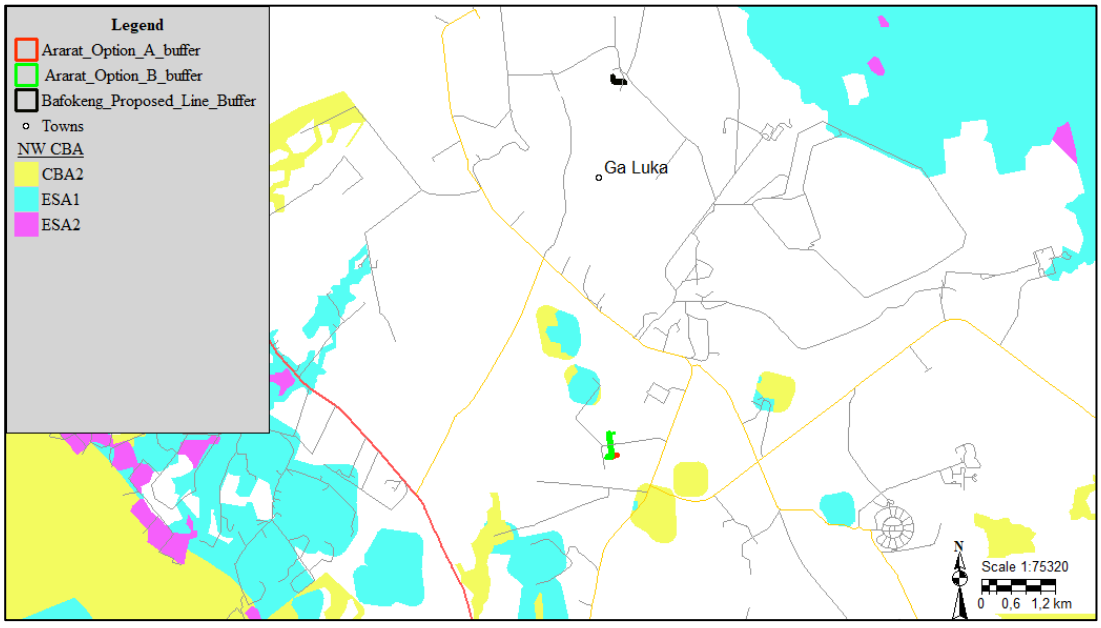

Figure 7. North West Biodiversity Sector Plan in relation to the project sites

7 REGIONAL VEGETATION

The entire project sites fall within the Savanna Biome (**Figure 8**) and this Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants. This biome is defined by a herbaceous layer dominated by grass species and a discontinuous to sometimes very open tree layer (Low and Rebelo, 1996).

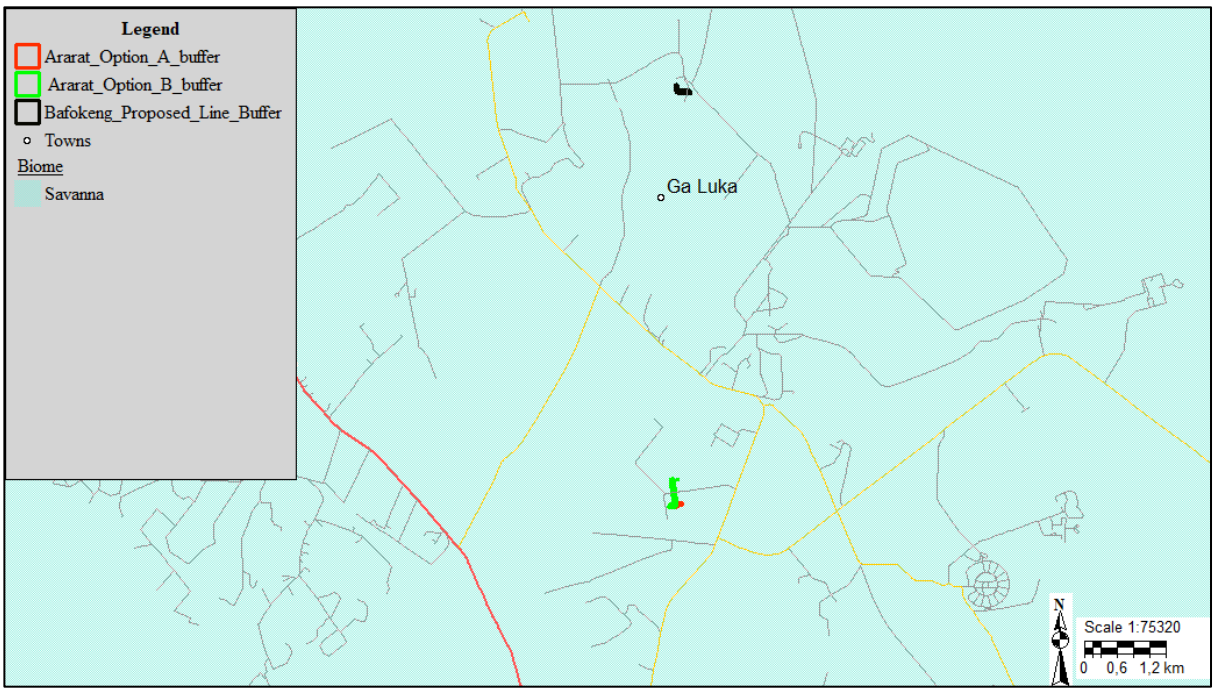

Figure 8. Biome in relation to the project sites

According the Mucina and Rutherford (2018), the Ararat site falls within the Marikana Thornveld vegetation type whilst Bafokeng site falls within the Zeerust Thornveld vegetation type, as indicated in **Figure 9**.

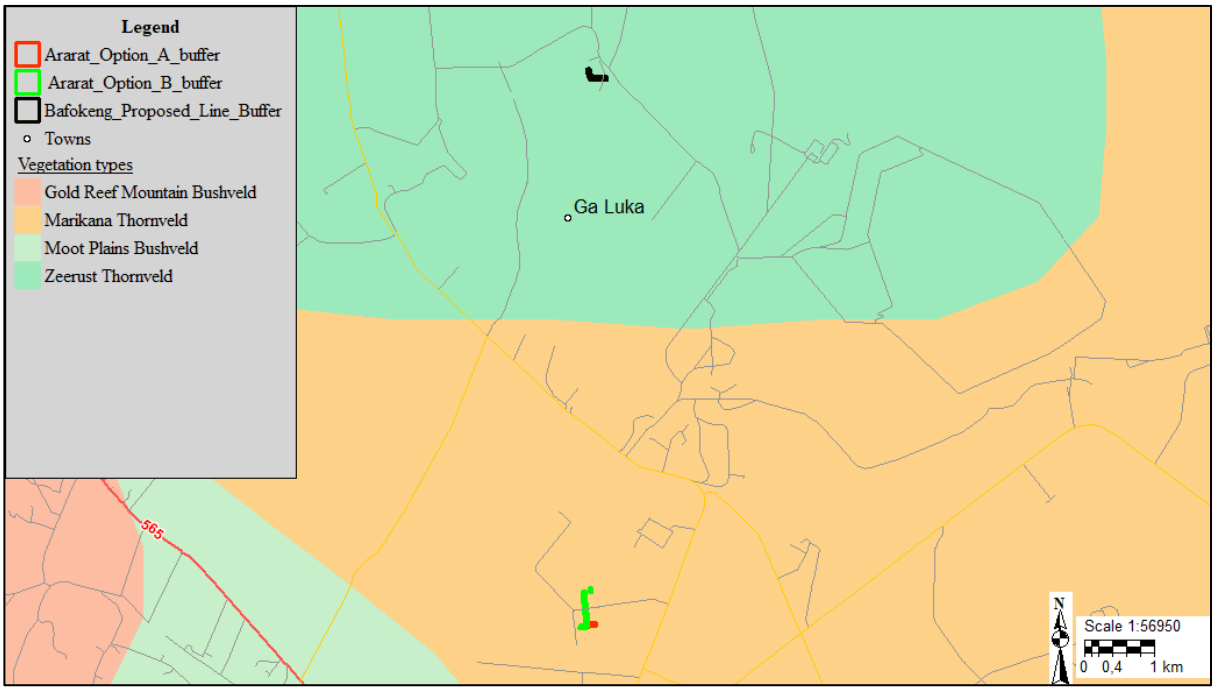

Figure 9. Vegetation types in relation to the project sites

The description of the vegetation types follow below:

7.1 Marikana Thornveld

Marikana Thornveld vegetation type is found in North-West and Gauteng Provinces. It occurs on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. It consists of more open Acacia karroo woodland and occurs in valleys, undulating plains and lowland hill (Mucina and Rutherford, 2006).

The important tree species that occur in this vegetation type include *Acacia nilotica, Acacia tortilis* subsp*. heteracantha, Ziziphus mucronata and Celtis africana.* Tall shrubs found include *Searsia pyroides* var*. pyroides, Grewia flava, Diospyros lycioides* subsp*. guerkei* and the grasses include *Elionurus muticus, Fingerhutia africana, Heteropogon contortus* and *Melinis nerviglumis.* Some of the herb species found here are *Hermannia depressa, Ledebouria revoluta* and *Ipomoea obscura.* Mucina and Rutherford (2006),

The conservation status of this vegetation type is classified as **Endangered** with a national conservation target of 19%. Less than 1% is statutorily conserved in Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land

transformation. Alien invasive plants occur localised in high densities, especially along the drainage lines (Mucina and Rutherford, 2006).

7.2 Zeerust Thornveld

Zeerust Thornveld vegetation type is found in North-West Province. It extends along the plains from the Lobatsi River in the west via Zeerust, Groot Marico and Mabaalstad to the flats between the Pilanesberg and western end of the Magaliesberg in the east (including the valley of the lower Selons River). This vegetation occurs as deciduous, open to dense short thorny woodland, dominated by *Acacia* species with herbaceous layer of mainly grasses. It occurs on deep, high base-status and some clay soils on plains and lowlands as well as between rocky ridges (Mucina and Rutherford, 2006).

The dominant species that occur in this vegetation type include *Acacia burkei, A. erioloba, Acacia melifera subsp. detinens, A. nilotica, A. tortilis subsp. heteracantha, Rhus lancea, Acacia fleckii, Peltophorum africanum, Terminalia sericea, Diospyros lycioides subsp. lycioides, Grewia flava, Mystroxylon aethiopicum* subsp*. burkeanum; Rhus maricoana, Agathisanthemum bojeri, Chaetacanthus costatus, Clerodendrum ternatum, Indigofera filipes, Rhus grandidens, Sida chrysantha, Stylosanthes fruticos; Eragrostis lehmanniana, Panicum pospischilii; Blepharis integrifolia, Chamaecrista absus, C. mimosoides, Cleome maculata, Dicoma anomala, Kyphocarpa angustifolia, Limeum viscosum* and *Lophiocarpus tenuissimus* (Mucina and Rutherford, 2006).

Zeerust Thornveld is considered to be **Least Threatened**. The conservation target for the area is 19% and less than 4% is statutorily conserved, spreading between four reserves including the Pienaar and Marico Bushveld Nature Reserves. Some 16% of the vegetation type has been transformed, mainly by cultivation, with some urban or built-up areas. A few areas are scattered with plants of the alien *Cereus jamacaru* and several other alien species are scattered elsewhere (Mucina and Rutherford, 2006).

8 THREATENED TERRESTRIAL ECOSYSTEMS

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (Government Notice 1002 (Driver *et al.* 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems.

It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina *et al*. 2006).

'Ecosystem protection level' is an indicator of how adequately an ecosystem is protected or not. Ecosystems can be classified as not protected, poorly protected, moderately protected or well protected depending on the proportion of each ecosystem that is under conservation management within a protected area, as recognized in the National Environmental Management: Protected Areas Act (Act 57 of 2003) –these protected areas include state or privately-owned protected areas as well a land under biodiversity stewardship agreements.

According to SANBI (2011) Threatened Ecosystems, only the Ararat site falls within the *Vulnerable* Marikana Thornveld threatened ecosystem (**Figure 10**). However, according to the National Biodiversity Assessment (2018), the project area falls within the threatened ecosystem, which is **Poorly Protected** on a national scale (**Figure 11**).

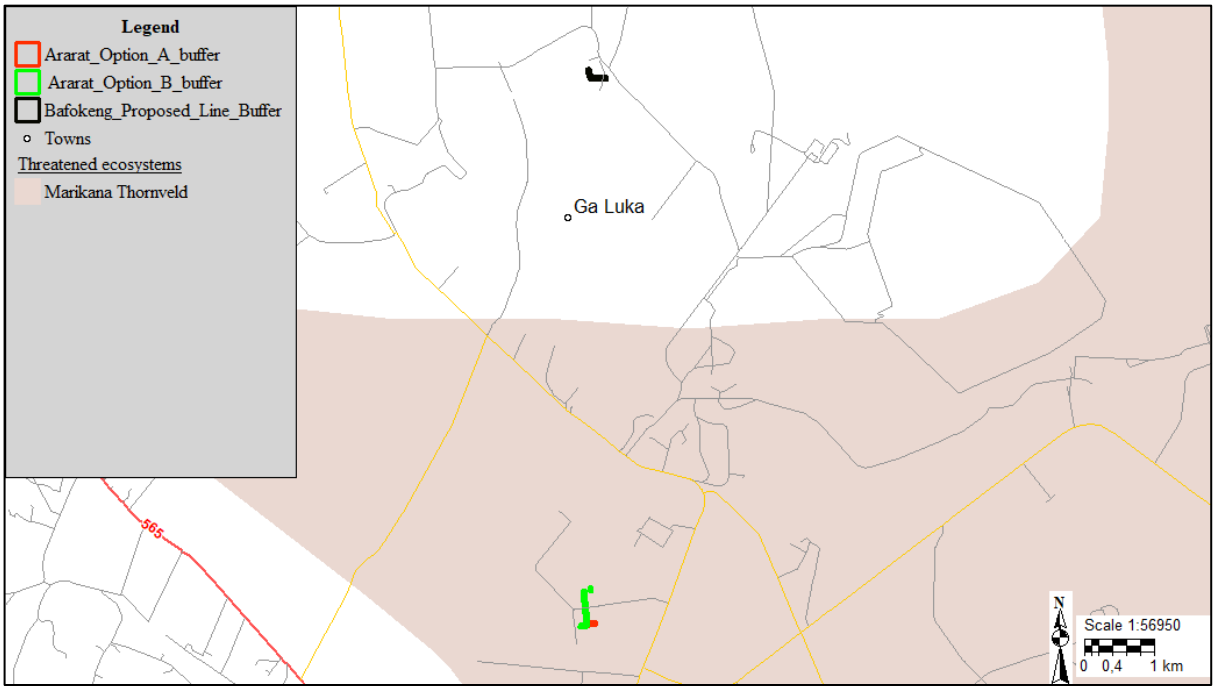

Figure 10. Threatened ecosystem within the project sites (SANBI, 2011)

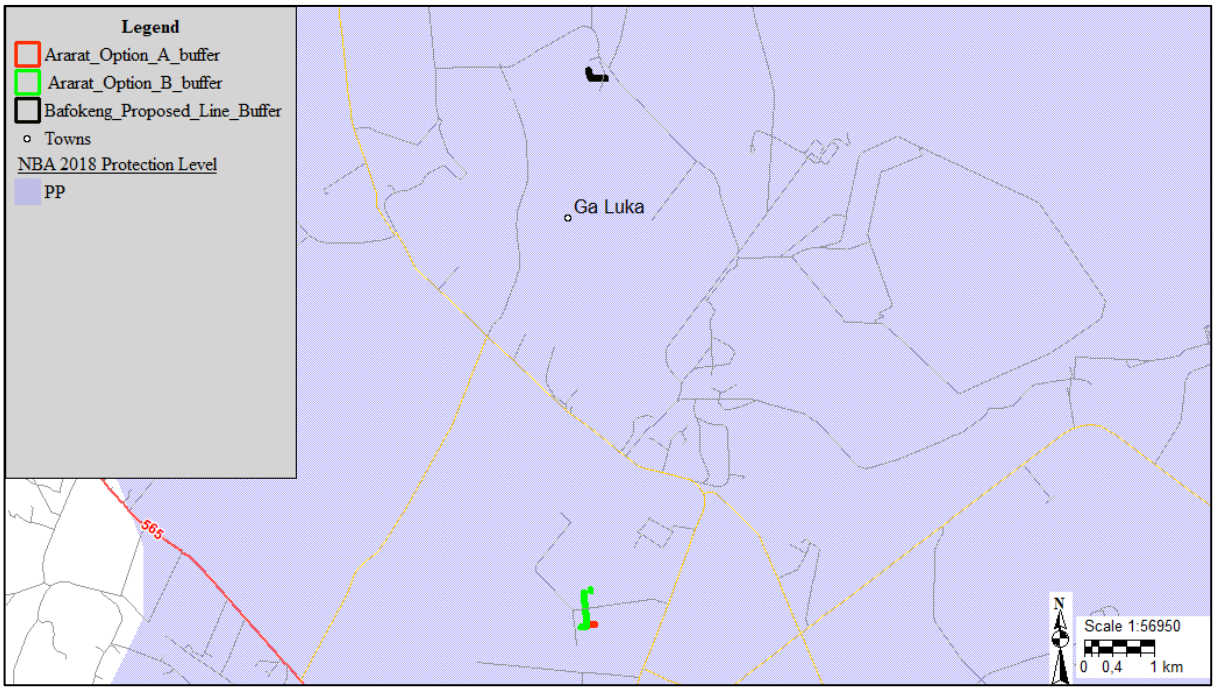

Figure 11. Threatened ecosystems Protection Level on the project sites (NBA, 2018)

9 PROTECTED AREAS

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and also to ensure the use of the natural resources in the area is sustainable.

The two proposed sites are not situated within any of the formally Protected Areas, and the closest one is approximately 10Km away from Ararat site, namely Magaliesberg Protected Natural Environment (**Figure 12**).

According to National Protected Areas Expansion Strategy (NPAES) (2008), its goal is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The two proposed sites do not fall within any of the NPAES focus areas, the closest being the NW/Gauteng Bushveld (**Figure 13**).

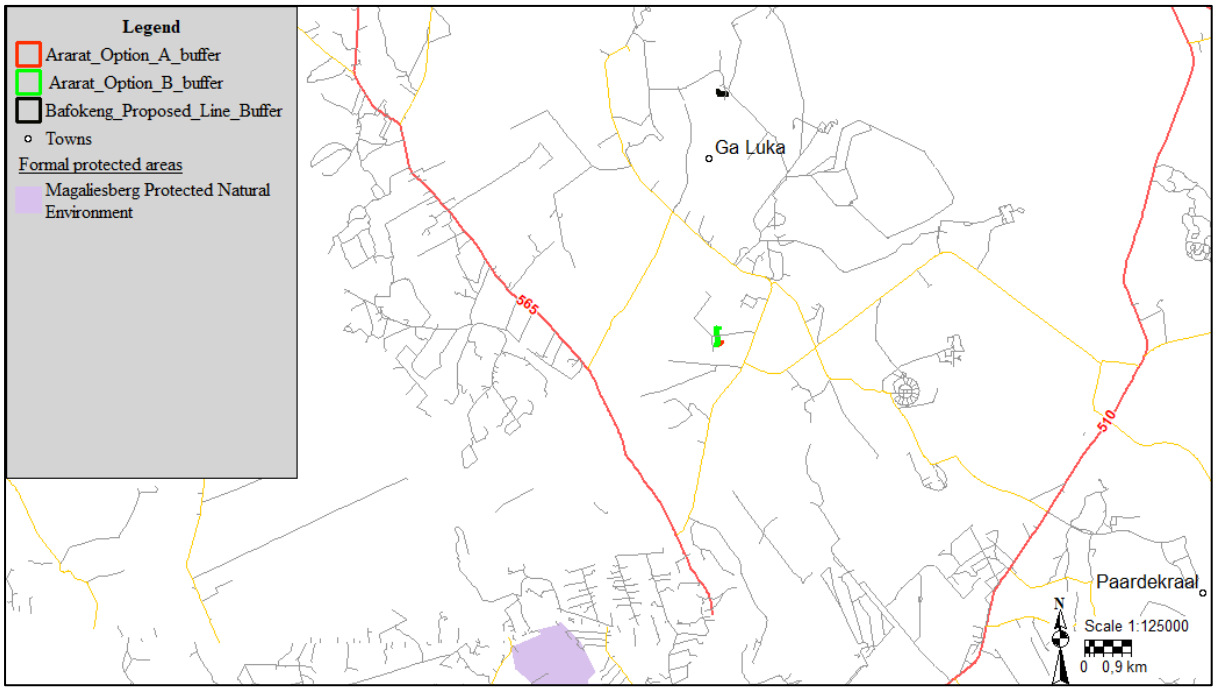

Figure 12. Magaliesberg Protected Natural Environment in relation to the project sites

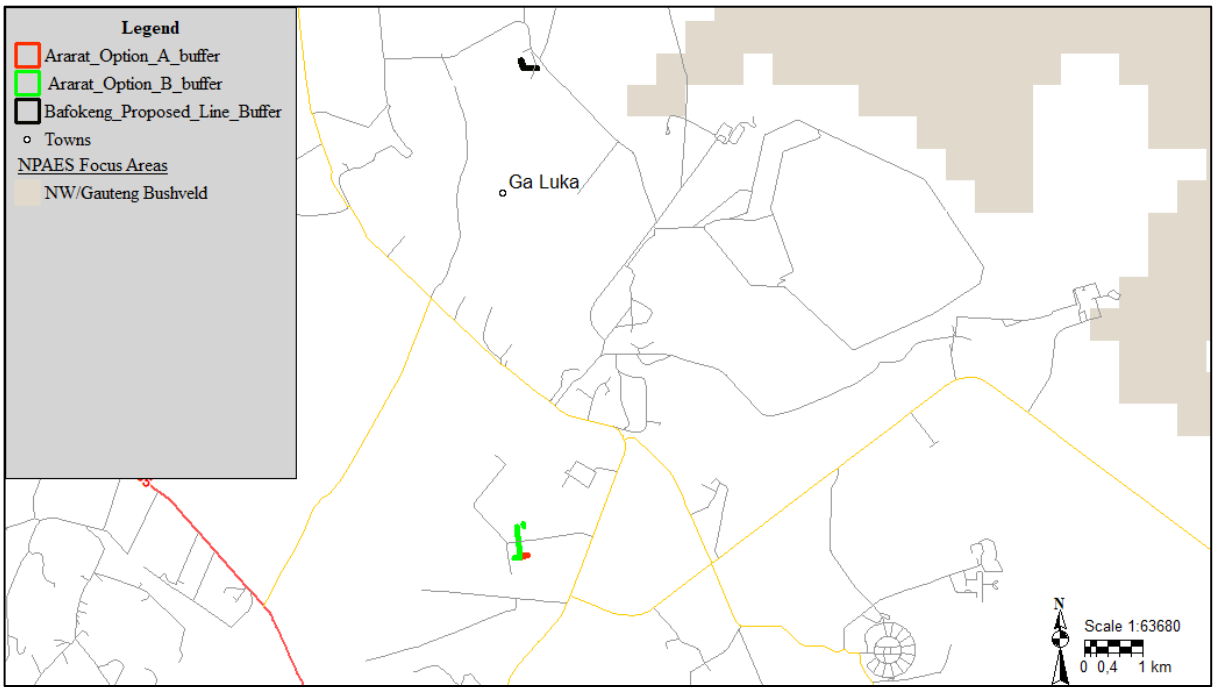

Figure 13. NW/Gauteng Bushveld in relation to the project sites

10 RESULTS AND DISCUSSION

10.1 Flora

10.1.1 Desktop study results

According to the data sourced from BODATSA, Red Data plant species which could potentially occur on or near the project sites are indicated in **Table 2** below. These plant species are associated with the Marikana Thornveld and Zeerust Thornveld vegetation types. The definitions of the conservation status are provided in **Table 3**.

Table 2. Red Data Plant species recorded in grid 2527AC and 2527CA which could potentially occur in the project sites (SANBI data).

Family	Species	Threat status	SA Endemic	Growth form
Amaryllidaceae	*Boophone disticha*	Declining/Least Concern	Not endemic	Geophyte, succulent, Herb
Aquifoliaceae	*Ilex mitis var. mitis*	Declining/Least Concern	Not endemic	Shrub, tree
Asphodelaceae	*Aloe peglerae*	Critically Endangered	Endemic	Dwarf shrub, herb, succulent
Crassulaceae	*Adromischus umbraticola* sbsp*. umbraticola*	Near Threatened	Endemic	Dwarf shrub, lithophyte, succulent
Gunneraceae.	*Gunnera perpensa*	Declining/Least Concern	Not endemic	Herb, hydrophyte
Hyacinthaceae	*Drimia sanguinea*	Near Threatened	Not endemic	Geophyte
Mesembryanthemaceae	*Frithia pulchra*	Rare	Endemic	Succulent
Myrsinaceae	*Rapanea melanophloeos*	Declining/Least Concern	Not endemic	Tree
Rosaceae	*Prunus africana*	Vulnerable	Not endemic	Tree

Table 3. Definitions of Red Data status (Raimondo *et al*. 1999)

Symbol	Status	Description
CR	Critically Endangered	A species is **Critically Endangered** when the best available evidence indicates that it meets at least one of the five International Union for Conservation of Nature (IUCN) criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
VU	Vulnerable	A taxon is **Vulnerable** when the best available evidence indicates that it meets any of the five IUCN criteria for Vulnerable and it is therefore considered to be facing a high risk of extinction in the wild.
NT	Near Threatened	A taxon is **Near Threatened** when available evidence indicates that it is close to meeting any of the five IUCN criteria for Vulnerable, and

Symbol	Status	Description
		is therefore likely to qualify for a threatened category in the near future.
N/A	Rare	A species is **Rare** when it meets at least one of four South African criteria for rarity, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria.

10.1.2 Plant species recorded on the project sites

The Ararat site is situated in an area which is less disturbed but dominated by highly invasive *Dichrostachys cinerea* (Sicklebush), whereas Bafokeng site is dominated with anthropogenic activities such as illegal dumping of materials and surrounded by human settlements (**Figure 14**). Plant species such as *Aloe davyana* (**Figure 15**)*, Ehretia rigida subsp. nervifolia* and *Vachellia karroo* were found on both sites. The graminoid layer was dominated by *Themeda triandra* and *Cynodon dactylon.* The vegetation composition and relatively low species diversity in these habitat units are typical of the Marikana Thornveld and Zeerust Thornveld vegetation types and the low diversity are results of disturbance or transformation. A list of plant species recorded on the project sites are listed in **Table 4** below.

Figure 14. Illegal dumping of materials on Bafokeng site

Figure 15. *Aloe davyana* recorded on both sites

Table 4. Plant species recorded on the project sites

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	Ararat sites		Bafokeng site
					Alt A	Alt B	
Fabaceae	*Acacia karroo* (*Vachellia karroo*)	Sweet thorn	Least concern	Tree		✓	
Fabaceae	*Vachellia tortilis subsp. heteracantha*	Umbrella Thorn	Least concern	Tree	✓		
Asteraceae	*Acanthospermum australe*	Creeping starbur	Least concern	Herb		✓	
Asparagaceae	*Agave sisalana*	Sisal	Category 2 AIS	Succulent			✓
Asphodelaceae	*Aloe davyana*	Grasaalwyn	Least concern/Medicinal	Succulent	✓	✓	✓
Amaranthaceae	*Alternanthera pungens*	Khakhiweed	Weed	Herb	✓	✓	✓
Poaceae	*Aristida congesta* subsp. *congesta*	Buffalo Grass	Least concern	Grass	✓	✓	
Asparagaceae	*Asparagus laricinus*	Bergkatbos	Least concern	Shrublet	✓	✓	✓
Asparagaceae	*Asparagus* cf. *suaveolens*	Bushveld Asparagus	Least concern	Shrublet			✓
Asteraceae	*Berkheya setifera*	Buffalo-tongue	Least concern	Herb		✓	
Asteraceae	*Bidens pilosa*	Common Black-jack	Weed	Herb	✓		✓
Poaceae	*Bothriochloa radicans*	Stinking Grass	Least concern	Grass	✓	✓	
Poaceae	*Chloris virgata*	Feather-top chloris	Least concern	Grass		✓	
Poaceae	*Cynodon dactylon*	Couch Grass	Least concern	Grass	✓	✓	✓
Solanaceae	*Datura ferox*	Long spined thorn apple	Category 1b AIS	Herb			✓
Solanaceae	*Datura stramonium*	Jimson weed	Category 1b AIS	Herb			✓
Fabaceae	*Dichrostachys cinerea*	Sicklebush	Least concern	Shrub	✓	✓	✓
Poaceae	*Digitaria eriantha*	Common Finger Grass	Least concern	Grass		✓	
Ebenaceae	*Diospyros lycioides*	Blue bush	Least concern	Tree		✓	✓
Boraginaceae	*Ehretia rigida subsp. nervifolia*	Puzzle bush	Least concern	Shrub		✓	✓
Poaceae	*Eragrostis curvula*	Weeping love grass	Least concern	Grass	✓	✓	

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	Ararat sites		Bafokeng site
					Alt A	Alt B	
Poaceae	*Eragrostis plana*	Fan Love Grass	Least concern	Grass		✓	
Poaceae	*Eragrostis superba*	Saw-tooth love grass	Least concern	Grass		✓	
Asteraceae	*Erigeron* (*Conyza*) *bonariensis*	Hairy fleabane	Least concern	Herb		✓	✓
Apocynaceae	*Gomphocarpus physocarpus*	Balloon milkweed	Least concern/Medicinal	Shrub		✓	
Malvaceae	*Hibiscus trionum*	Flower-of-an-hour	Least concern	Herb		✓	
Poaceae	*Hyparrhenia hirta*	Common Thatching Grass	Least concern	Grass	✓	✓	
Poaceae	*Hyperthelia dissoluta*	Yellow thatching grass	Least concern	Grass		✓	
Asteraceae	*Hypochaeris radicata*	Hairy wild lettuce	Least concern	Herb		✓	
Crassulaceae	*Kalanchoe lanceolata*	Narrow-leaved kalanchoe	Least concern	Shrub			✓
Verbenaceae	*Lantana camara*	Tick-berry	Category 1b AIS	Shrub			✓
Lamiaceae	*Leonotis leonurus*	Lion's ear	Least concern	Shrub	✓	✓	
Verbenaceae	*Lippia javanica*	Lemon Bush	Least concern/Medicinal	Herb		✓	
Poaceae	*Melinis repens*	Natal Red Top	Least concern	Grass		✓	
Fabaceae	*Mundulea sericea*	Cork Bush	Least concern	Shrub		✓	
Asteraceae	*Nidorella anomala*	Mokoteli	Least concern	Herb		✓	
Cactaceae	*Opuntia ficus-indica*	Sweet prickly pear	Category 1b AIS	Succulent	✓	✓	✓
Poaceae	*Panicum maximum*	Guinea grass	Least concern	Grass		✓	
Poaceae	*Paspalum dilatatum*	Dallas grass	Least concern	Grass		✓	
Plantaginaceae	*Plantago major*	Broadleaved Ribwort	Least concern/Medicinal	Herb	✓	✓	✓
Poaceae	*Pogonarthria squarrosa*	Herringbone Grass	Least concern	Grass		✓	
Asteraceae	*Pseudognaphalium luteo-album*	Jersey Cudweed	Least concern	Herb	✓	✓	
Rubiaceae	*Richardia brasiliensis*	Tropical Richardia	Weed	Herb		✓	✓
Anacardiaceae	*Searsia lancea*	Karee	Least concern	Tree	✓	✓	✓
Anacardiaceae	*Searsia pyroides*	Common wild currant	Least concern	Tree		✓	✓

Family	Scientific Name	Common Name	Ecological/Conservation status	Form	Ararat sites		Bafokeng site
					Alt A	Alt B	
Fabaceae	*Senegalia caffra*	Common Hook-thorn	Least concern	Tree		✓	
Poaceae	*Setaria sphacelata* var. *sphacelata*	Common Bristle Grass	Least concern	Grass		✓	
Poaceae	*Sporobolus africanus*	Ratstail Dropseed	Least concern	Grass		✓	✓
Solanaceae	*Solanum incanum*	Bitter Apple.	Weed	Herb	✓	✓	✓
Asteraceae	*Tagetes minuta*	Tall Khaki Weed	Weed	Herb			✓
Bignoniaceae	*Tecoma stans*	Yellow bells	Category 1b AIS	Tree			✓
Poaceae	*Themeda triandra*	Red grass	Least concern	Grass		✓	✓
Fabaceae	*Vachellia sieberiana*	Paperbark thorn	Least concern	Tree			✓
Asparagaceae	*Yucca glauca*	Soapweed Yucca	Alien speciess	Shrub			✓
Rhamnaceae	*Ziziphus mucronata*	Buffalo thorn	Least concern	Shrub		✓	✓

Note: AIS=Alien Invasive Species

10.1.3 Threatened Species and Species of Conservation Concern on the proposed sites

According to the South African Red data list categories done by SANBI (**Figure 16**), **threatened species** are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species whereas **Species of conservation concern** are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).

During the field survey, no threatened plant species were observed on the proposed project sites.

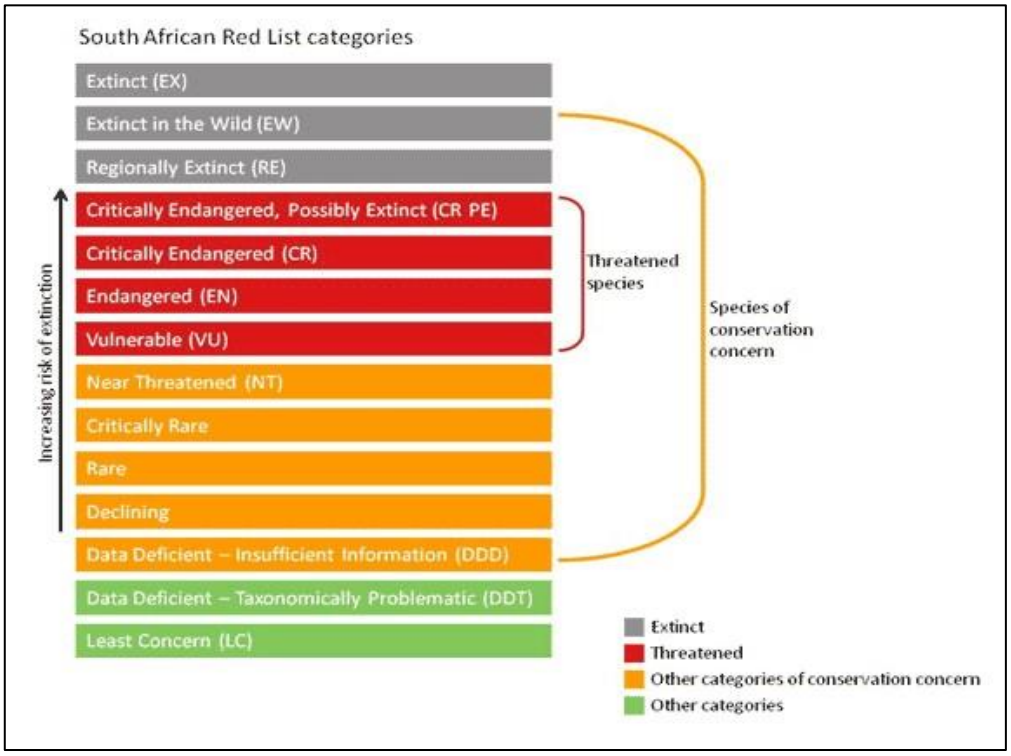

Figure 16. South African Red Data list categories

10.1.4 Alien invasive plant species recorded on the project sites

Alien Invader plant Species (AIS) are species of exotic origin that typically invade undeveloped or disturbed areas (Bromilow, 2010). AIS pose a threat to ecosystems because by nature they grow fast, reproduce quickly and have high dispersal abilities allowing them to replace indigenous species (Henderson, 2001).

Alien invasive plant species on the project sites (**Table 4**) were observed to occur in clumps, scattered distributions or as single individuals. Invader and weed species on site must be controlled to prevent further infestation and it is recommended that all individuals of invader and weeds species (especially Category 1b) must be removed and eradicated.

Alien plant species such as *Opuntia ficus-indica* (**Figure 17**) and *Datura ferox* (**Figure 18**) (Category 1b) dominated the project sites.

Figure 17. *Opuntia ficus-indica* on project sites

Figure 18. *Datura ferox* on Bafokeng site

10.1.5 Potential occurrence of Red Data plant species

Data sourced from SANBI website (BODATSA) indicates there are plant species on the Red Data List that are known to occur in or on areas surrounding the project area. The probability of occurrence is based on suitable habitat and known distribution ranges. The plant species and their probability of occurrence are indicated in **Table 5** below. Only plant species which have higher probability to occur on the project sites are shown in the table below.

Table 5. Red Data Plant species recorded in grid cells 2527AC and 2527CA which could potentially occur on the project sites.

Species	Threat status	Suitable habitat and ecology	Probability of Occurrence
Boophone disticha	Declining/Least Concern	Dry grassland and rocky areas.	Low
Ilex mitis var. mitis	Declining/Least Concern	Along rivers and streams in forest and thickets, sometimes in the open. Found from sea level to inland mountain slopes	Low
Aloe peglerae	Critically Endangered	It occurs in shallow, gravely quarzitic soils on rocky, north-facing slopes or summits of ridges.	Low
Adromischus umbraticola sbsp. *umbraticola*	NT	South-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south.	Low
Gunnera perpensa	Declining/Least Concern	Damp marshy area and vleis from coast to 2400 m.	Low
Drimia sanguinea	NT	Open veld and scrubby woodland in a variety of soil types.	Medium
Frithia pulchra	Rare	Magaliesberg. Coarse shallow, quarzitic soils and sandstones.	Low
Rapanea melanophloeos	Declining/Least Concern	Coastal, swamp and mountain forest, on forest margins and bush clumps, often in damp areas from coast to mountains.	Low
Prunus africana	VU	Evergreen forests near the coast, inland mistbelt forests and afromontane	Low

10.2 Fauna

10.2.1 Mammals

10.2.1.1 Desktop survey results

The potential mammal species that could be found on the project sites are those which have been recorded in the grid cells 2527AC and 2527CA (ADU, 2021) and also from distributions based on records documented in Skinner and Chimimba (2005), Monadjem *et al*., (2010) and Stuart & Stuart (2013) (**Table 6**). Conservation status assessments for each species were obtained from Child *et al*. (2016).

Table 6. Mammal species potentially occurring on the project sites

Family	Scientific name	Common name	Red list category
Bovidae	*Damaliscus lunatuslunatus*	Tsessebe	Vulnerable
Bovidae	*Hippotragus niger niger*	Sable Antelope	Vulnerable
Bovidae	*Pelea capreolus*	Vaal Rhebok	Near Threatened
Bovidae	*Ourebia ourebi*	Oribi	Endangered
Bovidae	*Philantomba monticola*	Blue Duiker	Vulnerable
Canidae	*Lycaon pictus*	African wild dog	Endangered
Elephantidae	*Loxodonta africana*	African Bush Elephant	Vulnerable
Felidae	*Acinonyx jubatus*	Cheetah	Vulnerable
Felidae	*Leptailurus serval*	Serval	Near Threatened
Felidae	*Panthera pardus*	Leopard	Vulnerable
Hyaenidae	*Crocuta crocuta*	Spotted Hyaena	Near Threatened
Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened
Manidae	*Smutsia temminckii*	Ground Pangolin	Vulnerable
Muridae	*Otomys auratus*	Southern African Vlei Rat	Near Threatened
Mustelidae	*Aonyx capensis*	African Clawless Otter	Near Threatened

10.2.1.2 Mammals recorded on the project sites

Habitat transformation due to the existing human settlements has negatively impacted on mammal occurrence, especially on Bafokeng site. Most sections of the project sites in their present state are not considered optimal habitat for larger mammal species due to hunting by locals. **Table 7** lists three mammal species recorded during the survey. No mammal SCC were recorded during the survey. The low mammal diversity was attributed to the transformed nature of the surrounding area, as well as the relatively high human density in the areas surrounding the project area. Continual habitat destruction, alteration and human disturbances results in the disappearance of the sensitive or secretive mammal species.

Table 7. Mammal species recorded on the project area

Family	Scientific name	Common name	Red list category
Bathyergidae	*Cryptomys hottentotus*	Common Mole-rat	Least concern
Muridae	*Mus musculus*	House mouse	Exotic
Muridae	*Rhabdomys pumilio*	Four-striped Grass Mouse	Least concern

10.2.1.3 Potential occurrence of Red Data mammal species

The desktop assessment indicated that there are Red listed mammal species which are known to occur in the general vicinity of the project site. **Table 8** below indicates the animal's preferred habitat together with its probability of occurrence on the project area. Only mammal species which have higher probability of occurrence on the study sites are discussed in the table below. The probability of occurrence was based on the consideration of the following factors:

- Known distribution;
- Overall abundance of a species;
- Availability of suitable habitat on the study sites;
- Availability of prey items on the study sites and surrounding areas;
- Level of anthropogenic disturbance; and
- Species tolerance to anthropogenic disturbance.

The Likelihood of occurrence was generally assessed as follows:

- **Confirmed**: either through current survey or through sightings, and local knowledge where provided.
- **High**: Distribution of the species occurs over the sites and the sites 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 (season or year).
- **Medium**: Distribution of the species occurs over the sites 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 at low density or erratic over site, but habitat and / or foraging areas are present on site and in the immediate surrounds.
- **Low**: 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 or erratic over site and habitat and foraging areas are sparse or absent.

Table 8. Red listed mammal species which could potentially occur on the project sites

Common name	Red list category	Suitable habitat	Probability of occurrence
Tsessebe	Vulnerable	Tsessebe formerly occurred in the bushveld and lowveld, often at the ecotone between grassland and woodland. Their preferred habitats are Kimberley Thornveld and Mopane Bushveld. They do not occur in forests, arid or montane habitats	Low
Vaal Rhebok	Near Threatened	Associated with rocky hills, grassy mountain slopes, and plateau grasslands in the eastern extent of their distribution	Low
Serval	Near Threatened	Servals are mostly found in and around marshland, well-watered savannah and long-grass environments, and are particularly associated with reedbeds and other riparian vegetation types	Low
Ground Pangolin	Vulnerable	Present in various woodland and savannah habitats, preferring arid and mesic savannah and semi-arid environments at lower altitudes, often with thick undergrowth. hey also occur in floodplain grassland, rocky slopes and sandveld, but are absent from Karroid regions, tropical and coastal forests, Highveld grassland and coastal regions	Low
Southern African Vlei Rat	Near Threatened	This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water.	Low
African Clawless Otter	Near Threatened	Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur	Low

10.2.2 Avifauna

10.2.2.1 Desktop survey results

The Important Bird and Biodiversity Areas (IBA) Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types (Barnes, 2000). As shown in **Figure 19** below, the project area does not fall within any of the IBAs. The nearest IBAs are *Magaliesberg*, situated approximately 9km, south of Ararat site and Pilanesberg National park, situated approximately17km north Bafokeng site.

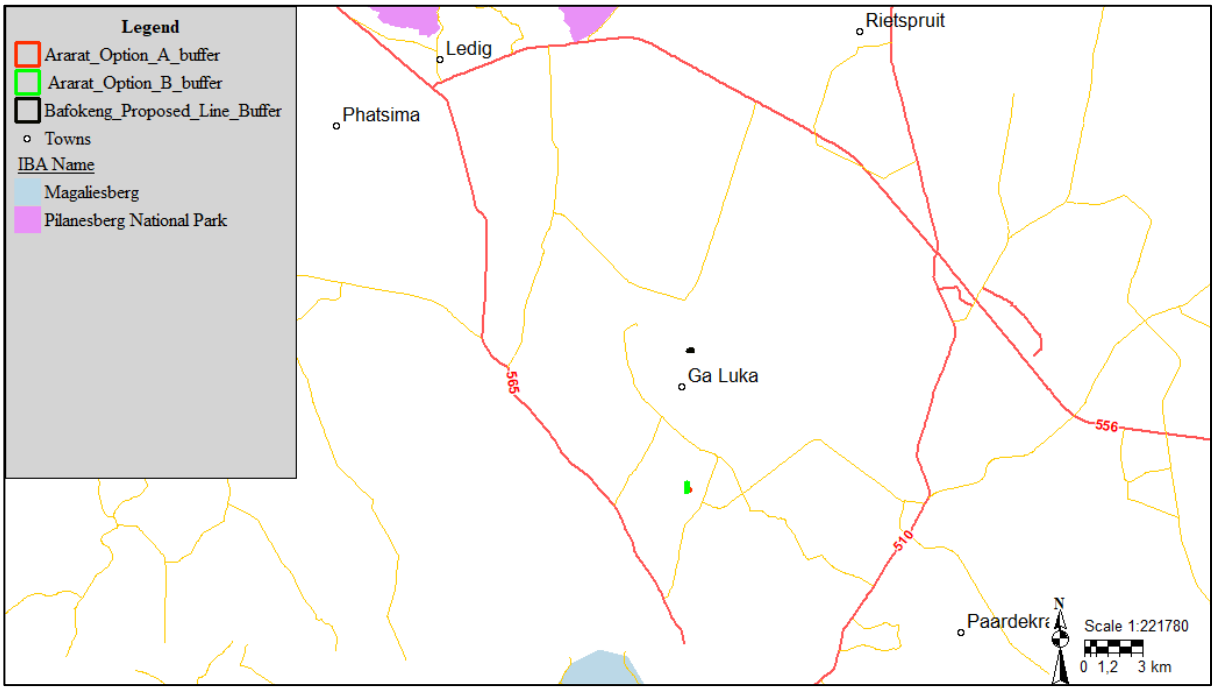

Figure 19. IBAs in relation to the project sites

The online database of the Southern African Bird Atlas Project (SABAP2) was queried for a list of bird species confirmed to occur in the relevant pentad (mapping unit) that the project area is located in, namely 2527AC and 2527CA QDS. Taylor *et al*. (2015) was consulted for the most current conservation status of each species of conservation concern on the list.

The List of bird species of conservation importance that are expected to occur in the quarter degree squares is indicated in **Table 9**.

Table 9. Red listed bird species which could potentially occur on the project sites

Species	Scientific name	Conservation status
African Grass-Owl	*Tyto capensis*	Vulnerable
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened

Species	Scientific name	Conservation status
Marabou Stork	*Leptoptilos crumeniferus*	Near Threatened
White Backed Vulture	*Gyps africanus*	Critically endangered
Lappet Faced Vulture	*Torgos tracheliotos*	Endangered
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened
Bateleur	*Terathopius ecaudatus*	Endangered
African Marsh Harrier	*Circus ranivorus*	Endangered
African Finfoot	*Podica senegalensis*	Vulnerable
Kori Bustard	*Ardeotis kori*	Near Threatened
Pink-backed Pelican	*Pelecanus rufescens*	Vulnerable
Martial Eagle	*Polemaetus bellicosus*	Endangered
Tawny Eagle	*Aquila rapax*	Endangered
Cape Vulture	*Gyps coprotheres*	Endangered
White-bellied Korhaan	*Eupodotis senegalensis*	Vulnerable
Black Stork	*Ciconia nigra*	Vulnerable
Yellow-billed Stork	*Mycteria ibis*	Endangered
Secretarybird	*Sagittarius serpentarius*	Vulnerable
Greater Flamingo	*Phoenicopterus roseus*	Near Threatened
Lesser Flamingo	*Phoeniconaias minor*	Near Threatened
Greater painted snipe	*Rostratula benghalensis*	Near Threatened
Lanner Falcon	*Falco biarmicus*	Vulnerable
Caspian Tern	*Sterna caspia*	Vulnerable
Yellow-throated Sandgrouse	*Pterocles gutturalis*	Near Threatened

10.2.2.2 Field work results and discussion

A numbers of bird species in South Africa have declined mainly due to massive habitat transformation and degradation as well as increased levels of human disturbances, extensive habitat transformation due to mining, industrial and commercial and agricultural activities (Low and Rebelo, 1996). Factors such as land-use alteration (urbanisation) contribute in the decline of many species. A number of avifaunal species are adaptable as they are habitat generalists and can therefore accommodate a certain degree of habitat degradation and transformation (Harrison *et al*., 1997). Other species are extremely habitat specific and have to rely on certain habitat units for breeding, hunting or foraging and roosting. Habitat-specific species are sensitive to environmental change, with destruction of habitat being the leading cause of species decline worldwide (Barnes, 2000). The project sites have two micro-habitats, namely woodland and patches of natural grassland.

Woodlands: The proposed sites will traverse through woodland habitat, which varies between broadleaved woodland, *Acacia*-dominated woodland, and open woodland with small scattered *Acacia* trees. The bird species within this habitat generally include a great variety of arboreal passerines, such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers, as well as arboreal non-passerines such as doves, cuckoos and woodpeckers. Many of these species make use of the thorny nature of these trees to build their nests. *Acacia* trees typically attract many insects and in turn attract a good diversity of typical bird species found in *Acacia* savanna.

The **patches of grasslands on** site represent a significant feeding area for many bird species. The grasslands are also a favourite foraging area for game birds such as francolins, Helmeted Guineafowl and Black-shouldered Kite. This in turn may attract raptors because of both the presence and accessibility of prey. Red Data Listed bird species such as Lanner Falcon and Martial Eagle, may often hunt in open grassland areas.

Twenty-Five (25) bird species (**Table 10**) were recorded during the field survey. Species recorded were common and widespread and typical of savanna biome. No Red Data bird species associated with the study sites were recorded.

Table 10. Bird species recorded on and around the study sites

Common name	Scientific name	Conservation status
Cattle Egret	*Bubulcus ibis*	Least concern
Hadeda Ibis	*Bostrychia hagedash*	Least concern
Black-shouldered kite (Black-winged kite)	*Elanus caerulus*	Least concern
Helmeted Guineafowl	*Numida meleagris*	Least concern
Blacksmith Lapwing (Plover)	*Vanellus armatus*	Least concern
Natal Francolin/Spurfowl	*Pternistis natalensis*	Least concern
Crowned lapwing (Plover)	*Vanellus coronatus*	Least concern
Speckled Pigeon	*Columba guinea*	Least concern
Rock Dove (Feral Pigeon)	*Columba livia*	Least concern
Laughing Dove	*Streptopelia senegalensis*	Least concern
Common (Indian) Myna	*Acridotheres zeylonus*	Introduced species
House Sparrow	*Passer domesticus*	Least concern
African Hoopoe	*Upupa africana*	Least concern
European Roller	*Coracias garrulus*	Least concern
Speckled Mousebird	*Colius striatus*	Least concern
Swainson's Spurfowl	*Pternistis swainsonii*	Least concern
Pied crow	*Corvus albus*	Least concern
Crested Barbet	*Trachyphonus vaillantiii*	Least concern
Common Fiscal (Shrike)	*Lanius collaris*	Least concern
Red-eyed Dove	*Streptopelia semitorquata*	Least concern
Spotted Eagle-Owl (**Figure 20**)	*Bubo africanus*	Least concern
Brown Snake-eagle (**Figure 21**)	*Circaetus cinereus*	Least concern
Cape (Orangethroated) Longclaw	*Macronyx capensis*	Least concern
Rattling Cisticola	*Cisticola chiniana*	Least concern
Blue-waxbill (**Figure 22**)	*Uraeginthus angolensis*	Least concern

Figure 20. Spotted Eagle-Owl on Ararat site

Figure 21. Brown Snake-eagle on Ararat site

Figure 22. Blue-waxbill on Ararat site

10.2.2.3 Mortality due to collisions of birds with the overhead power lines

Although all birds have the potential to be affected by collisions, species groups most at risk of collision impacts are those with heavier bodies and relatively small wingspan, making them less movable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese. Another group of birds that are known to migrate at night are flamingos (van Rooyen, 2004). Both the Greater flamingo (*Phoenicopterus ruber*) and Lesser flamingo (*Phoenicopterus minor*) have been recorded from the region.

10.2.2.4 Mortality of birds due to electrocution on the power lines

According to van Rooyen (2004), electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution risk is strongly influenced by the power line voltage of the and design of the pole structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks.

Although electrocutions are possible on the 88kV power line infrastructure, it is assumed that the proposed project will be constructed using the standard Eskom steel monopole structure type, with the standard bird perch.

10.2.2.5 Habitat destruction and Disturbances due to powerlines

Habitat destruction and alteration will take place during the construction phase of power lines, and this happens with the clearing of the site itself and any associated infrastructures. The servitude also has to be maintained free of any natural vegetation, amongst other reasons to minimize the risk of fire. The destruction or alteration of natural habitat has an impact on birds breeding, foraging and roosting in close proximity to the site.

The construction and operational activities can impact on birds through disturbance, particularly during bird breeding activities and the activities of concern include heavy earth moving general vehicular movement and any other activities which result in noise or increased human activity in an area. Disturbance of non-breeding birds may simply require them to move further away or adjust their activities during the disturbance. This may be either temporary or permanent. Disturbance of breeding birds may result in lower breeding productivity, failed breeding in the relevant season, and temporary or permanent abandonment of a breeding site. All of these reduce the recruitment of young birds to the population and can have significant implications for Red Listed species in particular, many of which are slow to reach breeding age and breed in small numbers.

There are positive interactions between overhead powerlines and avifauna as well (van Rooyen, 2004):

1. Power lines have proven to be partially beneficial to many birds, including species such as Martial Eagles, Tawny Eagles, African White-backed Vultures, and even occasionally Verreaux's Eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce.
2. Pylons can provide a safe nesting and perching sites away from predators. Some Lesser kestrel colonies have been shown to use overhead lines almost exclusively as perching sites. This species has been recorded from the region and has been considered during the survey. Large colonies are not thought to occur within the area, however. Existing overhead wires and towers were noted to be utilised by a small raptor such as Black-winged Kite (**Figure 23**);
3. Pylons can also provide nesting sites within areas devoid of tall trees. This has enabled certain species to expand their range. Large trees were absent throughout the survey area and therefore this is of relevance.

Figure 23. Black-winged Kite on Ararat site

A shorter route alternative would be preferred that is located in close proximity to the existing Ararat substation. Studies have shown that migratory birds become familiar with the powerline patterns within an area and therefore learn to avoid them (van Rooyen, 2009).

10.2.2.6 Potential occurrence of Red Data bird species

Table 11 below indicates the preferred habitat, together with the probability of occurrence. The probability of occurrence is based on the availability of suitable habitat, known distribution, overall abundance, food availability, disturbance factors, anthropogenic change and the preferred habitats of the species. Only bird species which have higher probability of occurrence on the study sites are discussed in the table below.

Table 11. Red listed bird species which could potentially occur on the study sites

Species	Conservation status	Preferred Habitat	Probability of Occurrence
African Grass-Owl	Vulnerable	The species prefers thick grasses around wetlands and rivers which are not present in the project area. Additionally, this species specifically has a preference for nesting in dense stands of the grass species *Imperata cylindrica.*	Low
Marabou Stork	Near Threatened	It generally prefers open semi-arid habitats and wetlands, such as pans, dams and rivers.	Low
White Backed Vulture	Critically endangered	White-backed vultures are found in open wooded savanna and scattered trees, such as areas populated by Acacia and Mopane trees (*Colophospermum mopane).* They are mainly a lowland species but do however require tall trees for nesting and are often found nesting on electricity pylons in South Africa.	Low
Lappet Faced Vulture	Endangered	It generally prefers arid and semi-arid open woodland, especially with Acacia, Shepherds-tree (*Boscia albitrunca*), Purple-pod cluster-leaf (*Terminalia prunioides*) and Mopane (*Colophospermum mopane*).	Low
Half-collared Kingfisher	Near Threatened	It generally prefers narrow rivers, streams and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes.	Low
Bateleur	Endangered	It generally prefers savanna and woodland habitats, such as arid Acacia savanna and miombo (*Brachystegia*) woodland and Mopane (*Colophospermum mopane*) woodland, especially with long grass. It may also move into drainage-line woodland in semi-desert shrubland.	Low
African Marsh Harrier	Endangered	It is locally common in northern Botswana, the Caprivi Strip (Namibia), Zimbabwe, eastern Mozambique and South Africa (excluding the arid Karoo and Kalahari). It generally favours inland and coastal wetlands.	Low
African Finfoot	Vulnerable	It generally prefers quiet wooded watercourses bordered by dense riparian vegetation, largely avoiding fast-flowing and stagnant rivers. It is a rarely seen bird because of its habits and habitat.	Low
Kori Bustard	Near Threatened	It generally prefers dry, open savanna, Nama karoo, dwarf shrublands, occasionally moving into grassland and dense, closed-canopy woodland.	Low
Martial Eagle	Endangered	It tolerates a wide range of vegetation types, being found in open grassland, scrub, Karoo, agricultural lands and woodland. It relies on large trees (or electricity pylons) to provide nest sites as well as windmills and even cliffs in treeless areas.	Low
Tawny Eagle	Endangered	It generally prefers lightly-wooded savanna, but it also occurs Nama Karoo and treeless grasslands, provided that there are pylons and alien trees to nest in.	Low
Cape Vulture	Endangered	It can occupy a variety of habitat types, although it especially favours subsistence farming communal grazing areas, where there is plenty of livestock to feed on.	Low

Species	Conservation status	Preferred Habitat	Probability of Occurrence
White-bellied Korhaan	Vulnerable	It generally prefers fairly tall, dense sour or mixed grassland, either open or lightly wooded, occasionally moving into cultivated or burnt land	Low
Black Stork	Vulnerable	Associated with rivers, dams and cliffs.	Low
Yellow-billed Stork	Endangered	It generally prefers wetlands, such as pans, flood plains, marshes, streams, flooded grassland and small pools, occasionally moving into mudflats and estuaries.	Low
Secretarybird	Vulnerable	It is usually found in the open grasslands and savannah of the sub-Saharan region	Low
Greater Flamingo	Near Threatened	It generally prefers coastal mudflats, inland dams, sewage treatment works, small temporary pans and river mouths, while it exclusively breeds at recently flooded, large eutrophic shallow salt pans.	Low
Lesser Flamingo	Near Threatened	It generally favours open, eutrophic and shallow wetlands, coastal mudflats, salt works and sewage treatment plants; it exclusively breeds on salt pans and saline lakes.	Low
Greater painted snipe	Near Threatened	It is typically found in the wetlands of tropical and subtropical lowlands, occurring in areas such as swamps, overgrown rice fields, freshwater lakes and mangroves	Low
Lanner Falcon	Vulnerable	Inhabits a wide variety of habitats, from lowland deserts to forested mountains.	Low
Caspian Tern	Vulnerable	It generally prefers sheltered bays, estuaries and large inland water bodies, especially dams and saline pans.	Low
Yellow-throated Sandgrouse	Near Threatened	It generally prefers short, open grassy plains with moist clay-like soils, especially on or near seasonal rivers, swamps or flood plains, also occupying fallow fields and cultivated land.	Low

10.2.3 Reptiles

10.2.3.1 Desktop survey results

According to the data sourced from the South African Reptile Conservation Assessment (ADU, 2021) for the grid cells 2527AC and 2527CA and historic distribution (Alexander & Marais, 2007), only one Red data reptile species is known to occur in the region, namely Nile Crocodile (*Crocodylus niloticus*), listed as Vulnerable (Bates *et al.* 2014).

10.2.3.2 Reptiles recorded on and around the study sites

The bushveld and dwellings provide suitable habitats for reptile species to occur on the project area. The study sites support limited suitable habitat for any arboreal species but provided suitable habitat for terrestrial reptile species. Termite mounds (**Figure 24**) were present on site and old termite mounds offer important refuges especially during veld fires as well as cold winter months for numerous snake species (Jacobsen, 2005). No termite mounds were destroyed during the brief field survey. All overturned rock material was carefully replaced in its original position. Only two reptile species were recorded during the survey, namely Distant's Ground Agama (*Agama aculeata distanti*) (**Figure 25**) and Speckled Rock Skink (*Trachylepis punctatissima*). No reptile Species of Conservation Concern were recorded on the project development sites. According to the anecdotal information, Brown House Snake (*Boaedon capensis*) has been seen on site. This reptile species is known to frequent human dwellings where it feeds on rodents or lizards. It is widespread in South Africa and very common in suburban gardens (Branch, 2001).

Figure 24. Old termite mound on Ararat-Alternative route B site

Figure 25. Distant's Ground Agama on Ararat-Alternative route B site

10.2.3.3 Potential occurrence of Red Data reptile species

Only one reptile SCC could potentially occur in the project sites, namely Nile Crocodile. According to Branch (2001), Nile Crocodiles can be found in larger rivers, lakes, estuaries, mangrove swamps. They are considered important indicators of ecosystem health and predators within a variety of aquatic habitats and listed as Vulnerable (Branch, 1988). They are considered as keystone species in aquatic environments. They are threatened due to over-exploitation, uncontrolled hunting, disease, pollution and habitat degradation. Crocodile Specialist Group (1996) listed this species on the Convention on International Trade in Endangered Species (CITES) Appendix I [except the populations of Botswana, Egypt (subject to a zero quota for wild specimens traded for commercial purposes), Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Namibia, South Africa, Uganda, the United Republic of Tanzania (subject to an annual export quota of no more than 1,600 wild specimens including hunting trophies, in addition to ranched specimens), Zambia and Zimbabwe, which are included in Appendix II. The project area does not offer suitable habitat for this species to occur on the project sites.

10.2.4 Amphibians

Amphibians are an essential part of South Africa's exceptional biodiversity and are such worthy of both research and conservation. Frogs and tadpoles are good species indicator of water quality, because they have permeable, exposed skins that readily absorb toxic substances. Tadpoles and frogs are aquatic and greatly exposed to aquatic pollutants (Blaustein, 2003).

10.2.4.1 Desktop survey results

FitzPatrick Institute of African Ornithology (2021), data from the South African Frog Atlas Project (SAFAP) (1999-2003) and du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences and only one frog Species of Conservation Concern could potentially be found within the study sites, namely Giant Bull Frog (*Pyxicephalus adspersus*), listed as Near Threatened (Minter *et al.* 2004).

10.2.4.2 Field work results

The non-perennial watercourse (**Figure 26**) within the Ararat site area holds water on a temporary basis and are important breeding habitat for most of the frog species which could occur within the study sites. During the field survey, no frog species were recorded on the project site. However, frog species such as Guttural Toad (*Sclerophrys gutturalis*), Bubbling Kassina (*Kassina senegalensis*) and Common Platanna (*Xenopus laevis*) have been recorded in abundance in the region (Carruthers, 2001).

Figure 26. Non-perennial river on Ararat site

10.2.4.3 Potential occurrence of Red Data frog species

The only Species of Conservation Concern which is known to occur in the region is the Giant Bullfrog, which usually breeds within the Grassland biome, but also has been shown to breed within savanna wetlands. It is is known to breed in seasonal shallow grassy pans, vleis and other rain filled depressions in open flat areas of grassland or savanna (Du Preez and Carruthers, 2009). They are explosive breeding frogs which utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. The project area does not offer any suitable habitat for this species to occur. According to the IUCN Red List category (Minter *et al*. 2004), this species is currently assigned a Near-Threatened status. Globally, it is listed as Least Concern (du Preez and Cook, 2004). According to National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) *Threatened or Protected Species*, this species is listed as *protected*. No suitable habitat for this species occurs on the project site, however, should this species be found during construction, the necessary permits should be acquired from NWDACERD and any Giant Bullfrogs present on the site, should be re-located to adjacent areas with suitable habitats.

11 TERRESTRIAL ECOLOGICAL SENSITIVITY ANALYSIS OF THE STUDY SITES

The determination of specific ecosystem services and sensitivity of ecosystem components and processes, both abiotic and biotic, is rather complex and no single overarching criterion will apply to all habitats investigated. Sensitivity analysis does not only consider aspects that are found on the study sites, but also consider the possibility of reinstatement or re-establishment of the original environment and its biota, or at least the rehabilitation of ecosystem services resembling the original state after an area was significantly degraded. The main aspects of an ecosystem that need to be incorporated in the ecological sensitivity analysis included the following:

- Describing the nature and number of species present, taking into consideration their conservation value as well as the probability of such species to survive or re-establish itself following disturbances, and alterations to their specific habitats, of various magnitudes;
- Identifying the species or habitat features that are ‘key ecosystem providers’ and characterising their functional relationships (Kremen, 2005);
- Determining the aspects of community structure that influence function, especially aspects which influence the stability or rapid decline of communities (Kremen, 2005);
- Assessing key environmental factors that influenced the provision of services (Kremen, 2005)
- Gaining knowledge about the spatio-temporal scales over which these aspects operate (Kremen, 2005).

Based on the information above, sensitivity classes have been summarised as follows (**Table 12**):

Table 12. Sensitivity classes (Kremen, 2005)

CATEGORY	DESCRIPTION
High sensitivity	Areas that are relatively undisturbed or pristine, and; • Very species-rich relative to immediate surroundings; • Or have a very unique and restricted indigenous species composition; • Otherwise, constitute specific habitats for fauna and flora of conservation concern, and where the total extent of such habitats and associated species of conservation concern remaining in southern Africa is limited; and • Excessive disturbance of such habitats may lead to species or ecosystem loss.
Medium sensitivity	Areas where disturbances are at most limited and; • Areas with a species diversity representative of its natural state, but not exceptionally high or unique compared to its surroundings; • Areas of which the biotic or abiotic configuration does not constitute a very specific or restricted habitat or very high niche diversity; • Areas which provide ecosystem services needed for the continued functioning of the ecosystem and the continued use thereof (e.g., grazing); • while species of conservation concern may occur on the area, these are not restricted to these habitats only; • Areas which need to remain intact to ensure the functioning of adjacent ecosystems, or wildlife corridors or portions of land that prevent the excessive fragmentation of natural flora and fauna populations, or areas that will be difficult to rehabilitate to a functional state after physical alteration; and • With a high species diversity and potentially higher number of species of conservation concern.
Low sensitivity	Areas which have been previously disturbed or; • Areas that have a low ecological value. • Areas which provide limited ecosystem services. • Species diversity may be low or all species present have a much wider distribution beyond this habitat or locality; • Plant SCC may be present on such areas, but these are not restricted to these habitats only and can be relocated with ease; • Further inputs may include landscapes where the abiotic nature is such that it can be rehabilitated relatively easy to allow the re-establishment of the original species composition, and where the development will not lead to any unjustified degradation of landscapes or ecosystem services if adequately mitigated.

The Ararat site is assigned a *Medium* sensitivity because of its ecological functionality i.e. “Areas which need to remain intact to ensure the functioning of adjacent ecosystems, or wildlife corridors or portions of land that prevent the excessive fragmentation of natural flora and fauna populations, or areas that will be difficult to rehabilitate to a functional state after physical alteration”. The Bafokeng site is assigned a *Low sensitivity* as “Areas which have been previously disturbed, Areas that have a low ecological value and Species diversity may be low or all species present have a much wider distribution beyond this habitat or locality”.

Any activities occurring within the two proposed sites must be effectively mitigated in order to prevent adverse impacts on them or also on the surrounding habitat units.

12 ENVIRONMENTAL IMPACT ASSESSMENT

12.1 Impact Assessment Methodology

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects / impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrices use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability:	**This describes the likelihood of the impact actually occurring**
Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design, mitigation measures or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable:	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.
Duration:	**The lifetime of the impact**
Short Term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span that is as long as the activity
Medium Term:	The impact will last up to the end of the phases, where after it will be negated.
Long Term:	The impact will last for the entire operational phase of the project, but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	The impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
Scale:	**The physical and spatial size of the impact**
Local:	The impacted area extends only as far as the activity, e.g., the footprint.
Site:	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
Regional:	The impact could affect the area including the neighbouring district areas.
Magnitude / Severity:	**Does the impact destroy the environment, or alter its function?**
Low:	The impact alters the affected environment in such a way that natural processes are not affected.
Medium:	The affected environment is altered, but functions and processes continue in a modified way.
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance:	**This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required**
Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate:	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
High:	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

Table 13: Weights Assigned to Each Attribute

Aspect	Description	Weight
Probability	Improbable	**1**
	Probable	**2**
	Highly Probable	**4**
	Definite	**5**
Duration	Short term	**1**
	Medium term	**3**
	Long term	**4**
	Permanent	**5**
Scale	Local	**1**
	Site	**2**
	Regional	**3**
Magnitude / Severity	Low	**2**
	Medium	**6**
	High	**8**
Significance	**SUM (Duration, Scale, Magnitude) x Probability**	
	Negligible Impact	**≤ 20**
	Low Impact	**> 20 ≤ 40**
	Moderate Impact	**> 40 ≤ 60**
	High Impact	**> 60**

The significance (**Table 13**) of each activity is rated without mitigation measures (WOM) and with mitigation (WM) measures for pre-construction, construction, operational phases of the proposed development.

12.1.1 Impacts on Flora and Fauna

The pre/construction phases of the proposed development are anticipated to have direct impacts on floral habitat. Site clearing will potentially result in permanent removal of floral habitat and therefore the disturbance of vegetation must be limited only to areas of construction.

Based on the results of the field survey, it is evident that the project site provides low to medium habitat to a number of fauna species. Although it is assumed that the majority of fauna species will move to different areas as a result of disturbance, many SCC fauna species have a specific habitat requirement and the destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their demise. However, due to the study sites providing low to medium suitable habitats for SCC fauna to occur, this impact can be mitigated.

The servitude for the powerline will require periodic maintenance to abate fire risks and to control tall trees. This maintenance will displace individuals that utilise these areas. This impact is regarded as being of limited relevance and of a low significance. Maintenance of the servitude must remain within the designated servitude only and no indiscriminate habitat destruction outside of the designated area should be allowed.

The potential disturbance of soil during construction activities on site encourages the establishment of pioneer vegetation, in many cases creating an ideal opportunity and optimal conditions for weeds and alien invasive plants to invade both disturbed and adjacent undisturbed areas after construction has been completed. Alien Invasive plants can have far reaching detrimental effects on indigenous vegetation and has been widely accepted as being a leading cause of biodiversity loss. The large amount of disturbance created during construction will leave the study sites and adjacent undeveloped areas vulnerable to alien plant invasion. Failure to manage rehabilitation and landscaping well can lead to serious alien invasive plant infestation.

Increased levels of noise, disturbance and human activity during construction may be detrimental to fauna. The risk of illegal hunting/poaching/trapping of wildlife for various uses is likely. Many species would however become habituated to the activities and would return to normal activity after some time. Direct faunal impacts during operation are likely to be limited to the project area. The operational phase of the proposed development will be permanent. Potential impacts on local faunal species as a result of disturbance/displacement has been assessed as not significant at a local scale.

The impact of fatalities from collision with the powerline by avifaunal species is then regarded as the most significant medium to long-term impact. The development of the powerline will require the clearing of a servitude as a safety factor, which will include removal of trees and shrubs that occur beneath or close to the overhead line. This will result in displacement of species. Each tower footprint will also be impacted through habitat destruction, but this is

thought to be of lesser significance and of a short term. In order to mitigate for the impact of bird collisions, it is strongly advised that the shortest alternative route in Ararat side be used. The actual overhead powerline and associated towers are thought to not have a significant long-term impact as most of the habitat impacted during the construction phase will be either reinstated as part of a rehabilitation plan, or the vegetation will naturally reinstate. This means that avifauna will be temporarily displaced, but will return back into the area once disturbance impacts (mainly limited to the construction phase) are completed. In order to rate the impact of electrocutions an assumption was made with regard to structural design of the Eskom power line poles. It is assumed that a steel monopole is generally a safe design for birds and the fitment of the standard bird perch further increases this safety and this the impact of electrocution is seen as low.

If disturbed areas are not rehabilitated/re-vegetated, erosion may continue throughout the operational phase of the project. This is likely to be exacerbated by stormwater runoff from any hardened/impermeable surfaces such as roads, compacted soil, etc. Due to the disturbance likely to be created by construction activities within the project area, this impact is most likely to occur within the project area, but could potentially occur outside the project area as well if suitable avoidance and mitigation measures (**Table 14**) were not implemented during construction.

12.1.1.1 Pre-construction / Construction Phases

Activities associated with the pre-construction and construction phases, include the following:

- Vegetation clearance of the site; and
- Removal of topsoil, and topsoil/spoil stockpiling;

Potential impacts to flora the pre-/and construction phases, include the following:

- Loss of flora habitat due to vegetation clearance;
- Destruction of indigenous flora during site establishment;
- Encroachment, proliferation and spread of weeds and alien invasive plant species;
- Increased soil erosion due to site clearance and incorrect storm water management measures;
- Loss of topsoil and increased erosion.
- Inadvertent killing and injury of fauna species during vegetation clearance;
- Loss/displacement of fauna species potentially present on sites;
- Disturbance of local fauna populations and
- Loss of fauna habitat due to vegetation clearance.

12.1.1.2 Operational Phase

Activities associated with the operational phase, include the following:

- Vegetation management activities and

- Fauna (especially birds) management activities.

Potential impacts associated with the operational phase, include the following:

- AIPs and weeds
- Disturbance to ecological processes due to altered habitat and disturbance to natural movements/processes;
- Loss of flora and fauna habitat due to operational activities.
- Disturbance to ecological processes due to altered habitat and disturbance to natural movements/processes;
- Collision of birds with overhead cables
- Electrocution of birds and
- Disturbance of local faunal communities.

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Table 14: Potential impacts and recommended mitigation measures with significance rating before and after mitigation

Impact	Project Phase	Mitigation measures	Magnitude/Severity	Scale	Duration	Probability	Significance
Destruction of indigenous flora during site establishment	Pre-Construction	Without Mitigation	6	2	4	4	48
		With Mitigation	4	2	3	4	36
Loss and displacement of animals on site due to habitat loss and mortality	Pre-/Construction & Operational	Without Mitigation	6	3	4	4	52
		With Mitigation	2	2	1	4	20
Encroachment, proliferation and spread of weeds and alien invasive plant species.	Pre-/Construction & Operational	Without Mitigation	8	3	5	5	80
		With Mitigation	6	2	3	4	44
Loss of topsoil and increased erosion.	Pre-/Construction & Operational	Without Mitigation	6	2	4	4	48
		With Mitigation	4	2	3	4	36
Inadvertent killing and injury of fauna species during vegetation clearance	Construction & Operational	Without Mitigation	6	3	4	4	52
		With Mitigation	2	2	1	4	20
Destruction and degradation of habitats	Construction & Operational	Without Mitigation	6	3	5	5	70

Impact	Project Phase	Mitigation measures	Magnitude/Severity	Scale	Duration	Probability	Significance
		With Mitigation	6	2	3	4	44
Collision of birds with overhead cables	Operational	Without Mitigation	8	3	5	5	80
		With Mitigation	2	2	1	4	20
Electrocution of birds	Operational	Without Mitigation	8	3	5	4	64
		With Mitigation	2	2	1	4	20
Rehabilitation of the site after construction activities	Operational	Without Mitigation	2	2	1	4	20
		With Mitigation	8	3	5	4	64

12.1.2 Environmental Management Programme Report

Table 15 below forms the core of the EMPr for the pre-construction, construction, and operational phases of the project development.

Table 15: Environmental Management Programme for the proposed Ararat-Bafokeng 88kV project (Pre/Construction and Operational phases)

Flora and Fauna

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
Pre-Construction Phase			
Destruction of indigenous flora during excavation and site establishment.	• Pre-construction environmental induction must be conducted to all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to conservation and importance of protected trees, provincially protected plants, no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. • Environmental Control Officer (ECO) should provide supervision and oversight of vegetation clearing activities. • Plant species such as *Aloes* could be searched, rescued and relocated on site as part of landscaping and or rehabilitation process. • All laydown, storage areas, site camps etc. should be restricted to within the project area and should preferably be situated within areas of low sensitivity. • Clearly demarcate the construction footprint prior to clearing of vegetation. Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site. • Building material or ablution facilities should not be stored or kept in areas containing natural vegetation.	Contractor, EO and ECO	As required

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
	• Proliferation of alien invasive plant species is expected within the disturbed areas and they should be eradicated and controlled to prevent further spread. • Development planning must ensure that loss of vegetation and disturbance is restricted to within the recommended site layout footprint. • Surrounding areas with indigenous vegetation should under no circumstances be fragmented or disturbed further or used as an area for dumping of waste.		
Loss and displacement of animals on site due to habitat loss and mortality	• Training of construction personnel to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily. • The Contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during pre-and construction phases. • All construction vehicles must use designated access roads. Off-road driving should be strictly prohibited. • Fauna (mammals, and reptiles) that become trapped in any excavation or in any construction related activity may not be harmed and must be rescued and relocated by a suitably qualified person. • During site preparation, special care must be taken during the clearing of the works area in order to minimise damage or disturbance of roosting and nesting sites. • Where possible, work should be restricted to one area at a time, as this will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed area close to their natural territories. • Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed.	Developer, Contractor, EO and ECO	As required
Construction Phase			

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
Loss of vegetation due to fuel and chemical spills from the use of electrical equipment e.g., generator and storage of hazardous substances.	• The application of prevention measures, in addition to proper handling of hazardous waste will be mandated to each personnel operating on the site to ensure protection of the environment. • Storage containers must be regularly inspected to enable early detection of leaks. • Mixing of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of storm water. • The spillage of harmful or toxic substances can be mitigated by the implementation of best practice management measures for the storage and handling of all hazardous substances as well as through the implementation of a sound emergency spillage containment plan, which can be implemented as soon as the spill of harmful or toxic stance occurs. • Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. • Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use. • Material Safety Data Sheets (MSDSs) shall be available on site for all hazardous substances used on site. • Cement/concrete batching is to be located in an area to be hardened and must first be approved by the ECO and no batching activities shall occur directly on the ground.	Developer, Contractor, EO and ECO	As required

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
	• Vehicle maintenance should not take place on site unless a specific lined and bunded area is constructed within the construction camp for such a purpose. • Spillages of fuels, oils and other potentially harmful chemicals should be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and rehabilitated timeously and appropriately.		
Encroachment, proliferation and spread of weeds and alien invasive plant species.	• Alien invasive plants and weeds (listed in this study) can be removed manually or with the help of simple tools. This entails damaging or removing the plant by physical action. • Topsoil stockpiles, in particular, should be kept free of weeds and alien and alien invasive plant species. • Promote awareness of all personnel. • Regular monitoring for alien invasive plants within the study sites as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems.	Contractor and ECO	Continuous Monitoring
Loss of topsoil and increased erosion.	• The construction activities should be set up in such a way that the area of exposed soil is minimised during times of the year when the potential for erosion is high, e.g., during the summer when intense rainstorms are common in North West province. • During site preparation, topsoil and subsoil are to be stripped separately from each other and must be stored separately from spoil material for later use in the rehabilitation phase. It should be protected from wind and rain, as well as contamination from diesel, concrete or wastewater. • Sediment barriers or sediment traps such as silt fences, sandbags etc. must be established to curb erosion and sedimentation where necessary.	Contractor and ECO	Continuous Monitoring

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
	• Topsoil stockpiles are not be used as storm water control features. • Storm water runoff from the stockpile sites and other related areas must be directed into the storm water system with the necessary pollution prevention measures such as silt traps and may not run freely into the surrounding areas. • Topsoil stockpiles must be monitored for alien invasive plants growth. • No plant, workforce or any construction-related activities may be allowed onto the topsoil stockpiles. • Topsoil stockpiles must be clearly demarcated as no-go areas. • Stockpiles must not be higher than 2 m in order to avoid compaction, and thereby maintain the soil integrity and chemical composition. • All slopes that are disturbed during construction shall immediately be stabilised to prevent erosion. Where revegetation of slopes is undertaken, this shall be done in consultation with the ECO or relevant personnel.		
Inadvertent killing and injury of fauna species during vegetation clearance.	• If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter). • Before and during the vegetation clearance, any larger fauna species noted on site should be given a chance to move away from the construction activities. • Any fauna threatened by the construction activities should be moved to safety by a suitable qualified ECO or an Ecologist. • All personnel should undergo an environmental induction with regards to fauna, in particular awareness about harming or collecting species such as snakes, tortoises. • If trenches are to be dug, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are left open should have	Developer, Contractor, EO and ECO	Continuous Monitoring

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
	places where there are soil ramps, which will allow fauna to escape the trench. • No animals should be intentionally destroyed or killed, and no hunting or poaching of animals is allowed in the project site or adjacent areas. • No food or similar waste that may attract wild animals should be disposed of at the site. All food and litter waste should be placed in sealed bins and removed from the site each day. • Where construction vehicles must traverse the site, they must remain on demarcated roads. If vehicles must leave the road for construction purposes, they should utilize a single track and should not take multiple paths. • In order to reduce collisions of vehicles with fauna, speed limits should apply to all roads and vehicles using the site, a maximum of 40 km/h is recommended. Animals should have right of way.		
Operational phases			
Erosion caused by inadequate/failing stormwater management measures/designs	• All hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • All cleared areas should be revegetated with indigenous perennial grasses from the local area. • Ensure that there is compliance with all national, regional and local legislation with regard to the disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Developer, EO and Contractor	Continuous Monitoring
Loss and/or degradation of floral habitat. Disturbance to ecological processes due to altered habitat	• Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for	Developer and EO	Continuous Monitoring

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
and disturbance to natural movements/processes	development purposes, should be incorporated into landscaped areas. • Vegetation clearing should be kept to a minimum, and this should only occur where it is absolutely necessary. • All alien seedlings and saplings must be removed as they become evident for the duration of operational phase. • Control of alien invasive species and noxious weeds for areas disturbed by the construction activities, in accordance with the requirements of the NEM:BA Alien and Invasive Species Regulations. • Prevent contamination of natural vegetation by any pollution. • All waste generated will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site. • Clear the area of all inert waste and rubble.		
Disturbance of local fauna populations	• Animals residing within the designated area shall not be unnecessarily disturbed. However, any fauna threatened by operation activities should be removed to safety by a suitable qualified person. • Snake handling should be strictly limited to qualified staff or a dedicated external snake handler. • When accessing the facility, vehicles are to utilise the existing roads. • Ensure that no unnecessary clearing of faunal habitat occurs during maintenance activities. • No fires by maintenance personnel are allowed. • No wild animal may be fed on site. • Ensure that the project area is kept clean, tidy and free of rubbish that would attract animal pests. • The collection or hunting of any animals at the facility or in the surrounding areas should be strictly forbidden.	Developer and EO	Continuous Monitoring

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
	• All vehicles accessing the site should adhere to a low-speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and small rodents. • Ensure that staff understand that no form of wildlife poaching, killing, collecting or other form of disturbance can be permitted on site or adjacent areas. • Monitoring impacts of operational activities on fauna so that adaptive management practises can be implemented if and when required. • All waste generated at the facility should be kept in scavenger proof bins and removed from site at regular intervals.		
Collision of birds with infrastructures	• Fitment of devices on the earth wires to make the lines more visible. • All construction and maintenance activities should be carried out according to generally accepted environmental best practices. In particular, care should be taken in the vicinity of the non-perennial river found within the Ararat site. Existing roads must be used as far as possible for access during construction. • Only a bird friendly pylon structure is permissible for the construction of the new proposed power line. This will ensure that large birds can perch and roost safely on the hardware.	Developer and EO	Continuous Monitoring
Electrocution of birds	• In order to prevent the electrocution of any birds, on the poles, all poles should be fitted with a standard type, Eskom approved “bird perch” at the top of the pole. This will provide ample safe perching space for any birds well clear of the dangerous hardware. • During operational phase, any nest found on the lines should be managed in accordance with Eskom Distribution Nest Management Guidelines and relevant provincial and national legislation.	Developer and EO	Continuous Monitoring

Environmental Impact	Mitigation Requirements	Responsible Party	Frequency
Rehabilitation of the site after construction activities	• Bare surfaces should be grassed as soon as possible after construction to minimise time of exposure. Locally occurring, indigenous grasses should be used. • Inspect rehabilitated area at three monthly intervals during the first and second growing season to determine the efficacy of rehabilitation measures. • Take appropriate remedial action where vegetation establishment is unsuccessful or erosion is evident. • All waste generated by the construction activities will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site. • As much vegetation growth as possible should be promoted within the study sites in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. • All areas of disturbed and compacted soils need to be ripped and profiled.	Developer and EO/ECO	Continuous Monitoring

12.1.3 Cumulative impacts

Cumulative impacts can be identified by combining the potential environmental implications of the proposed project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

- Land clearing activities and other construction-related disturbances could lead to the proliferation of exotic vegetation.
- Displacement of sensitive avifaunal species, species of conservation concern and protected trees due to habitat destruction and habitat fragmentation eventually leads to isolation and loss of those species. This is, however, considered to be low within the region.
- Destruction of nesting habitat displaces the affected species eventually leading to loss of those species.
- Cumulative loss of primary vegetation features due to exotic vegetation and vegetation transformation is high at the national level and therefore should be avoided;
- Encroachment of alien vegetation.
- Powerlines represent the largest proportion of established aerial infrastructure throughout the country and collision impacts are of national concern. Fitment of devices on the earth wires to make the lines more visible is reducing this impact at the national level.

12.1.4 Decommissioning

Post to the economic lifespan of the Ararat-Bafokeng 88kV project, decommissioning and rehabilitation will comply with the appropriate environmental legislation and best practices at that time.

13 CONCLUSION AND RECOMMENDATIONS

The project sites do not fall within any of the CBAs and ESAs categories. The Ararat site is situated in an area which is less disturbed but dominated by highly invasive *Dichrostachys cinerea* (Sicklebush), whereas Bafokeng site is dominated with anthropogenic activities such as illegal dumping of materials and surrounded by human settlements. Plant species such as *Aloe davyana, Ehretia rigida subsp. nervifolia* and *Vachellia karroo* were found on both sites. The graminoid layer was dominated by *Themeda triandra* and *Cynodon dactylon.* The vegetation composition and relatively low species diversity in these habitat units are typical of the Marikana Thornveld and Zeerust Thornveld vegetation types and the low diversity are results of disturbance or transformation.

During the field survey, no threatened plant species were observed on the project sites. Newly cleared soils will have to be re-vegetated and stabilised as soon as construction activities have been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging alien invasive plant species. The rehabilitation of disturbed areas should receive high priority and the plant species used during rehabilitation should be site specific and according to the surrounding vegetation composition. All development footprint areas should remain as small as possible and should not encroach onto surrounding areas.

Mammal species recorded on site were common and are typical of savanna vegetation. No fauna of conservation concern were recorded on both sites. The fragmented and transformed area has lost the ecological ability to sustain any medium faunal assemblage or community. The human presence and associated disturbances taking place usually have a detrimental impact on fauna species (especially mammals and snakes) in the area.

Generally, the development activities proposed within the project sites will not have a significant impact on biodiversity conservation within the region, provided that appropriate mitigations measures are implemented. It is the opinion of the ecologist, that the proposed development be considered favourably, provided that the mitigations measures are implemented and adhered to. The methodologies used and results found during the field survey, together with the impacts and mitigation measures provide confidence that the project can go ahead. At Ararat, the Alternative Route A is the preferred route as it is the shortest route (approximately 244.32m), which will lead to less clearing of natural/indigenous vegetation as compared to Alternative Route B (which is approximately 574.83m). There is no alternative route for the Bafokeng site and this site is situated in an area which is highly disturbed and fragmented, with little to no ecological significance.

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