

FINAL ECOLOGICAL REPORT FOR THE PROPOSED 88KV
PETRUSDAM SWITCH STATION, RAMOTSHERE MOILOA LOCAL
MUNICIPALITY (WARD 17), NORTH –WEST PROVINCE



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EXECUTIVE SUMMARY

Eskom Holdings Limited is proposing the construction of a new 88kV switch station on farm Roode Kopjes Put 32 JP Portion 14 approximately 40 km from Zeerust in Ramotshere Moiloa Local Municipality in North West Province. Baagi Environmental Consultancy was appointed by Eskom as the independent Environmental Assessment Practitioner (EAP) to undertake Environmental Impact Assessment for the proposed transmission lines & switch station. As part of the EIA process, this ecological specialist study conducted by EnviroSHEQ Consulting (Pty) Ltd details the ecological characteristics of the site and provides an assessment of the likely ecological impacts associated with the development. Impacts were assessed for the preconstruction, construction, operation and decommissioning phases of the development. A variety of avoidance and mitigation measures associated with each identified impact were recommended to reduce the likely impact of the development which should be included in the EMP for the development.

Information generated from this survey was used to identify the potential impacts that the construction and operational activities will have on the environment. In order to achieve this aim the following objectives were considered for this specialist study:

- To delineate the various vegetation/habitat types and describe their sensitivity present within the study area and to assess the current habitat and conservation status of plant and animal species in the study sites and comment on ecological sensitive species/areas;
- To carry out field surveys to gain an indication of the diversity and eco-status of the above-mentioned taxa which inhabit the proposed study area, as well as the presence of unique habitats that might need further investigation or protection;
- To determine if any flora and fauna species or assemblages will be directly impacted upon by the proposed construction activities, this includes flora and fauna communities present, the ecological state of these communities, identification of possible Red Data species (according to the International Union for the Conservation of Nature (IUCN) as well as considering National and Provincial criteria, and
- To assess the possible impacts of the proposed project on these taxa and/or habitats and to determine mitigation measures and management recommendations to mitigate negative and enhance positive impacts of the proposed switch station so as to reduce the severity of these impacts. In cases where impacts cannot be mitigated, areas may be regarded as 'no-go' owing to the presence of SSC or critical habitat, legislation and frameworks and
- To apply relevant literature to determine the diversity and eco-status of the plants and mammals, at the two proposed alternative sites;

From the investigation that was conducted ,the proposed construction of a new 88kV switch station is likely not to cause any major disturbance to the flora and fauna should the mitigation measures contained herein and other reports be observed . During desktop and field surveys, it was observed that the entire area falls within the Zeerust Thornveld under the Savanna Biome. The site falls within an Ecological Support Area (ESA) and vegetation community conservation status was classified as the Least Threatened Ecosystem

Two protected tree species (*Acacia Erioloba* and *Boscia albitrunca*) as listed in the National Forests Act 1998 (Act No 84 of 1998) were recorded during the field investigation. The site biodiversity value assessment was classified as of moderate value in line with the methodology applied.

ABBREVIATIONS

CBA 1	Critical Biodiversity Area 1
CBA 2	Critical Biodiversity Area 2
CBD	Convention on Biological Diversity
DEA	Department of Environmental Affairs
DAFF	Department of Agriculture, Forest & Fisheries
END	Endangered Species
ESA 1	Ecological Support Area 1
ESA 2	Ecological Support Area 2
THR	Threatened Species
RD	Red Data Species
VUL	Vulnerable Species

GLOSSARY

Corridors: Have important functions as strips of a particular type of landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "stepping stones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.

Degraded habitat/land: Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.

ECO/ESO: Environmental Control/Site Officer – person responsible for the Day-to-Day Environmental Management on-site during construction

Ecological Processes: Ecological processes typically only function well where natural vegetation remains, and in particular where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened

Ecosystem status: Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem

Ecosystem: All of the organisms of a particular habitat, such as a lake or forest, together with the physical environment in which they live.

Endangered: Endangered terrestrial ecosystems have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised.

Endemic: A plant or animal species, or a vegetation type, which is naturally restricted to a particular defined region. It is often confused with indigenous, which means 'native, occurring naturally in a defined area'.

Environment: The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects

Exotic: Non-indigenous; introduced from elsewhere, may also be a weed or alien invasive species. Exotic species may be invasive or non-invasive.

Fragmentation (habitat): Causes land transformation, an important current process in landscapes as more and more development occurs

Habitat: The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.

Indigenous: Native; occurring naturally in a defined area

Least threatened terrestrial ecosystems: These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).

Riparian: Pertaining to, situated on or associated with a river bank

River corridors: River corridors perform a number of ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas

Transformation: In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.

Transformed Habitat/Land: Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe

overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.

Tributary/ Drainage line: A small stream or river flowing into a larger one.

Untransformed habitat/land: Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes

Vulnerable: Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat

Weed: An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens.

Wetlands: A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

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1. INTRODUCTION

Eskom Holdings Limited is proposing the construction of a new 88kV switch station on farm Roode Kopjes Put 32 JP Portion 14 approximately 40 km from Zeerust in Ramotshere Moiloa Local Municipality in North West Province. Baagi Environmental Consultancy was appointed by Eskom as the independent Environmental Assessment Practitioner (EAP) to undertake Environmental Impact Assessment for the proposed transmission lines & switch station. As part of the EIA process, this ecological specialist study conducted by EnviroSHEQ Consulting (Pty) Ltd details the ecological characteristics of the site and provides an assessment of the likely ecological impacts associated with the development. Impacts were assessed for the preconstruction, construction, operation and decommissioning phases of the development. A variety of avoidance and mitigation measures associated with each identified impact were recommended to reduce the likely impact of the development which should be included in the EMPr for the development. The full scope of study is detailed below.

In line with the aforementioned, the objective of the biodiversity assessment (flora and fauna) assessment was to identify sensitive species and their habitats in two proposed alternative sites as depicted in Figure 1. Biodiversity is defined, according the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), as “the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems”. The NEMBA legislation upholds the country’s commitment to the protection of South Africa’s biological resources and it is imperative that development takes place in a sustainable way in order to achieve this.

The current ecological status and conservation priority of vegetation on the sites were assessed. Potential faunal habitats were assessed in the study area and all mammals found occurring on sites were recorded. Red Data species that are known to likely occur on sites were also investigated.

1.1 Objectives of the survey

Information generated from this survey was used to identify the potential impacts that the construction and operational activities will have on the environment. In order to achieve this aim the following objectives were considered for this specialist study:

- To delineate the various vegetation/habitat types and describe their sensitivity present within the study area and to assess the current habitat and conservation status of plant and animal species in the study sites and comment on ecological sensitive species/areas;
- To carry out field surveys to gain an indication of the diversity and eco-status of the above-mentioned taxa which inhabit the proposed study area, as well as the presence of unique habitats that might need further investigation or protection;
- To determine if any flora and fauna species or assemblages will be directly impacted upon by the proposed construction activities, this includes flora and fauna communities present, the ecological state of these communities, identification of possible Red Data species (according to the International Union for the Conservation of Nature (IUCN) as well as considering National and Provincial criteria, and
- To assess the possible impacts of the proposed project on these taxa and/or habitats and to determine mitigation measures and management recommendations to mitigate negative and enhance positive impacts of the proposed switch station so as to reduce the severity of these impacts. In cases where impacts cannot be mitigated, areas may be regarded as 'no-go' owing to the presence of SSC or critical habitat, legislation and frameworks and
- To apply relevant literature to determine the diversity and eco-status of the plants and mammals, at the two proposed alternative sites;

2. TERMS OF REFERENCE

The agreed Terms of Reference (ToR) include a desktop review, field investigation and report compilation. The precise methodologies employed are elaborated on in Section 5.

2.1 Desktop Review

The desktop review required compiling relevant information for the greater study area from reliable and recognised resources. This included the consulting of relevant national and international legislation and best practice approaches as well as the most recent aerial imagery.

2.2 Field Investigation

Field investigations took place during the dry season (June 2011). The agreed upon ToR for the field work component of the study were to include:

- Characterisation of vegetation in the study area in conjunction with an in-depth study including plant species lists, Species of Special Concern (SSC) and their locations, declared alien or

invasive species present and areas of sensitivity. In addition, all species of ethnobotanical (medicinal or cultural use) importance were recorded;

- A faunal investigation, including the identification of habitats, recording of evidence of faunal activity, opportunistic observations, and random transects were done and any SSC were recorded, and
- Identification of Areas of Sensitivity based on ecological function and SSC.

2.3 Report Compilation

- Review of relevant legislation applicable to the study;
- Explanation of the methodologies used;
- Results of the study include:
 - Delineation of vegetation habitats on site and a description of the structure and condition of these habitats;
 - A description of faunal diversity on site as well as their connection to the vegetation habitats identified; and
 - Listing of all SSC and their applicable national and international statuses.
- A sensitivity assessment of habitats identified;
- Maps throughout the report showing significant features of the study area;
- An Impact Assessment (IA) where all impacts of the construction and operation of the proposed mine on the flora and fauna on site are discussed. This includes the impacts on the presence of certain important species as well as the impacts on habitat diversity. The influence on the ecosystems in the area and their interactions are assessed and discussed.

3. STUDY AREA

The proposed switch station is located on farm Roode Kopjes Put 32 JP Portion 14 approximately 40 km from Zeerust, North West Province. It is situated within the Savanna biome, which is the largest biome in Southern Africa. The environmental factors for this biome include altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and virtually every major geological and soil type. Factors that delimit this biome include sufficient rainfall, fires and grazing of animals (SANBI, 2011). The two alternative sites are situated within the 2526AA and quarter degree grid cells (q.d.g.c) within the North West Province.

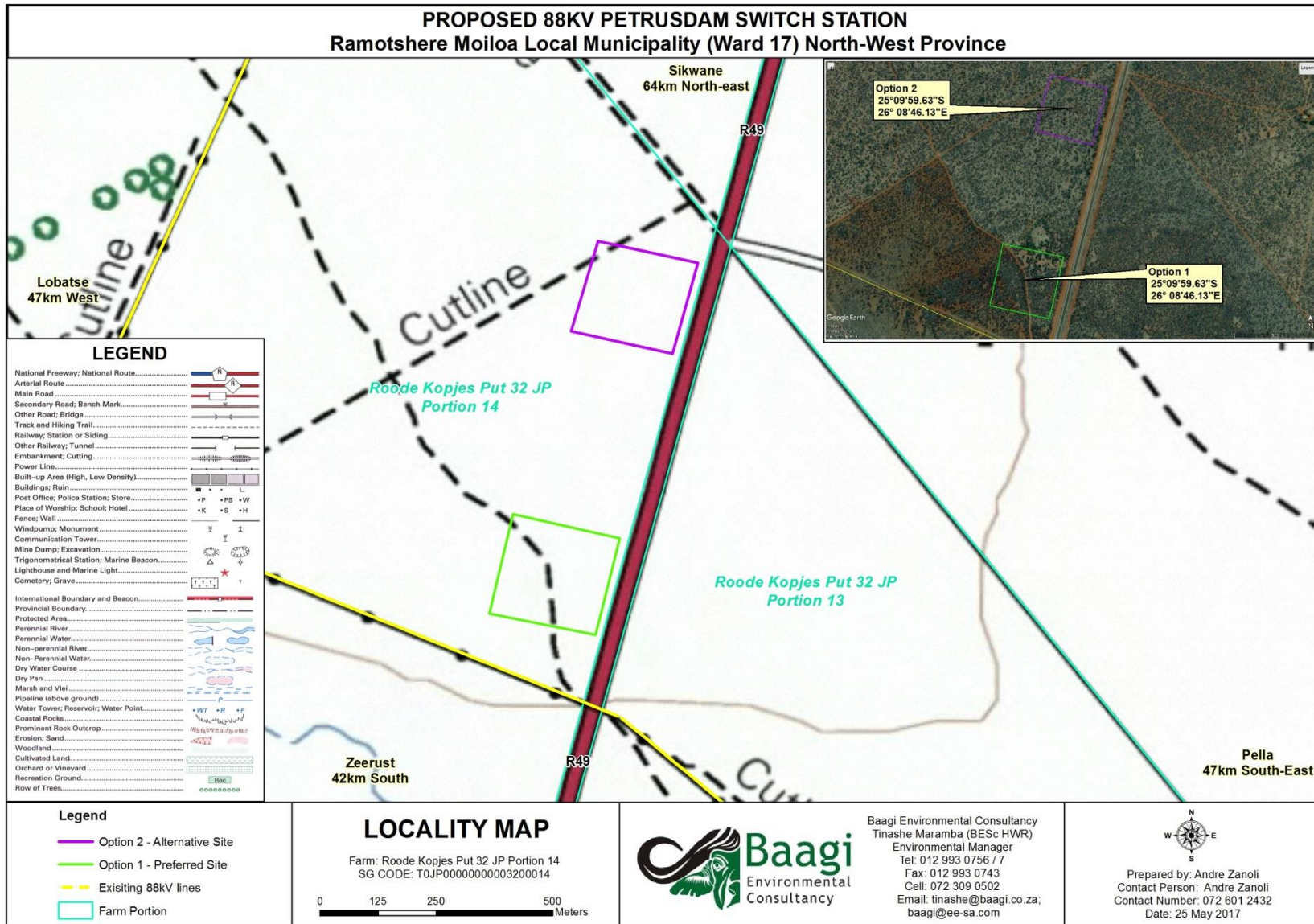


Figure 1 : Locality Map

4. RELEVANT LEGISLATION AND GUIDELINES

The following pieces of legislation were reviewed and informed this ecological study

- The Constitution, 1996 (Act 108 of 1996) – Section 24;
- National Environmental Management Biodiversity Act (Act 10 of 2004).
- North West Biodiversity Management Act, No4
- National Environmental Management Act (Act 107 of 1998);
- National Forests Act (Act No 84 of 1998);
- National Veld and Forest Fire Act (Act 101 of 1998);
- National Environmental Management: Protected Areas Act (Act No 57 of 2003);
- National Parks Act, 1976 (Act 57 of 1976);
- Nature Conservation Ordinance, Ordinance 19 of 1974;
- Conservation of Agricultural Resources Act (Act 43 of 1983);
- Environment and Conservation Act (Act 73 of 1989);
- The white paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- North West Province Biodiversity Conservation Assessment Technical Report Version 1.2 (2009);

5. METHODOLOGY

For flora and fauna, the following methodologies were used:

5.1 Flora

The floral assessment included a desktop and a field survey component as discussed below.

5.1.1 Desktop Study

Flora assessment consisted of two complementary approaches: desktop and field survey

- A desktop analysis of literature review, photographs, topographical maps, and Google Earth imagery. Satellite imagery of the area was obtained from Google Earth and was studied in order to get a three dimensional impression of the topography and land use and also to identify potential “hot-spots” or specialized habitats e.g. patches of undisturbed vegetation, river crossings and rocky ridges.

5.1.1.1 Regional Species List

A desktop study was undertaken, aiming to produce a checklist of all species identified on site. The following literature was consulted for this purpose:

- PRECIS (National Herbarium Pretoria Computerised Information System) (Appendix A);
- SIBIS: SABIF – South African Biodiversity Information Facility; and
- Mucina and Rutherford, 2006.

5.1.1.2 Species of Special Concern (SSC)

From the overall species list, a list of Species of Special Concern (SSC) can be drawn up. In order to be fully comprehensive, this list includes plants on each of the following lists:

- The SANBI Red List of South African plants version 2012;
- National Environmental Management Biodiversity Act (NEMBA 10 of 2004) listed species;
- National Forests Act, 1998 (Act No. 84 of 1998) (NFA) Protected Trees; and

An initial list of SSC expected to be found within the study area comprises of Possible Species of Special Concern (PSSC). If any of these (and any additional species on the above lists) are recorded on site, they are ascribed the status Confirmed Species of Special Concern (CSSC). The South African Red Data list uses the same criteria as that defined by the International Union for the Conservation of Nature (IUCN). According to the IUCN all species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation (IUCN, 2010). The categories are described in Table 2 below.

Table 1: International Union for the Conservation of Nature (IUCN) Criterion

CATEGORY		DESCRIPTION
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.
Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
Endangered	(EN)	High risk of extinction in the wild
Vulnerable	(VU)	High risk of endangerment in the wild.
Near Threatened	(NT)	Likely to become endangered in the near future.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
Data Deficient	(DD)	Not enough data to make an assessment of its risk of extinction.
Not Evaluated	(NE)	Has not yet been evaluated against the criteria.

The online IUCN database was referenced in order to identify Red Data species and their various threat status categorisations.

5.1.2 Field Investigation

The habitats of the study areas were inspected in a random zigzag fashion, paying particular attention to areas that at first sight appeared to be sensitive. All general observations were noted such as trees, shrubs, grasses and herbs (forbs). The habitats suitable for Red Data listed species known to occur in the quarter degree grid squares were examined intensively for the presence of such species. Attention was also paid to the occurrence of alien species and declared weeds. Field guides were utilised during the field work.

5.2 Fauna

The faunal study, like the vegetation assessment was comprised of both a desktop and a field survey component:

5.2.1 Desktop Study

5.2.1.1 Regional Species List

The following resources were used for the desktop component of the faunal investigation.

- The SIBIS online interactive species distribution map was used to obtain data for the distribution of mammals, reptiles, amphibians and terrestrial invertebrates within the greater study area. Data was acquired for the 2526AA Quarter Degree Squares (QDS) in which the study is located;
- The potential occurrence of mammals was supplemented by the species distribution maps in Friedman and Daly (2004), and

5.2.1.2 Species of Species Concern

The conservation statuses of fauna identified on site was determined using the following resources:

- The Convention on International Trade of Endangered Species (CITES) species database;
- The IUCN Red-Data List for South African fauna;
- The International IUCN Red-Data List, and
- NEMBA listed species.

5.2.2 Field Investigation

Pertinent notes were made during the survey and desktop studies were also conducted for mammals and reptile. All fauna species encountered on site were identified and recorded. The following methods were used during the survey:

5.2.2.1 Mammals

Site visit was conducted during the month of June 2017 and during this site visit the observed and derived presence of mammals associated with the recognized habitat types of the study site were recorded. This was done with due regard to the well recorded global distributions of Southern African mammals, coupled with the qualitative and quantitative nature of recognized habitats. The adjoining properties were also scanned for important fauna habitats. During the site visits mammals were identified by visual sightings through random transect walks.

Visual sightings and ecological indications were used to identify the mammal inhabitants of the study area; this includes scats, tracks and habitat such as burrows and dens. Scats found were collected (if required), photographed on scale along with any tracks found and identified. For identification purposes a field guide Mammals of Southern Africa (Smithers, 2000) was used.

5.2.2.2 Reptiles and Frogs

Herpetofauna include reptile and amphibian species. Direct / opportunistic observation was done along trails or paths within the project area. Any herpetofauna species seen or heard along such paths or trails within the project area was identified and recorded. Another method used was refuge examinations using visual scanning of terrains to record smaller herpetofaunal species which often conceal themselves under rocks and in fallen logs, rotten tree stumps, under rocks, in leaf litter, rodent burrows, old termite mounds, etc. Branch (1996) and Carruthers (2001) was used to confirm identification where necessary.

5.2.2.3 Red Data faunal assessment

The following parameters were used to assess the Probability of Occurrence of each Red Data species:

- Habitat requirements (HR) – Most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics in the study area was evaluated;
- Habitat status (HS) – The status or ecological condition of available habitats in the area is assessed. Often a high level of habitat degradation prevalent in a specific habitat will negate the potential presence of Red Data species (this is especially evident in wetland habitats); and
- Habitat linkage (HL) – Movement between areas for breeding and feeding forms an essential part of the existence of many species. Connectivity of the study area to surrounding habitat and the adequacy of these linkages are evaluated for the ecological functioning of Red Data species habitat within the study area.

Probability of occurrence is presented in four categories, namely:

- Low (will not occur);
- Medium (could possibly occur);
- High (most likely could occur); or
- Recorded (does occur on site).

The IUCN Red Data categories are defined as follows and it is used for the status identification of mammals, birds, reptiles and amphibians globally:

- **CRITICALLY ENDANGERED (CR):** A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild (IUCN, 2010);
- **ENDANGERED (EN):** A taxon is Endangered when it is considered to be facing a very high risk of extinction in the wild (IUCN, 2010);
- **VULNERABLE (VU):** A taxon is Vulnerable when the best available evidence indicates it to be facing a high risk of extinction in the wild (IUCN, 2010); and

- **NEAR THREATENED (NT):** A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN, 2010).

5.2.2.4 Assessment of sensitive landscapes and conservation importance/ significance

Subsequently all flora and fauna data were collectively assessed to determine areas that is of conservation importance. This was then collaborated with a desktop study and mapping which aimed at describing the proposed mining area and assessing the sensitive landscapes and conservation importance/significance of the proposed mining area. Sensitive areas will include areas with a unique or sensitive ecological system such as wetlands, ridges and Red Data species habitat. Nature reserves or proximity to nature reserves are also taken into account

Table 2: Information Sources

Reference Document	Description
Red List, South Africa	Listed species of flora and fauna are regarded as species whose representation in the wild, has declined to such an extent that drastic action is needed to ensure their survival.
PRECIS	The PRECIS list was obtained from the SANBI which lists all the Red Data plant species officially recorded by SANBI. This list represents only those species that may occur in the grid in which the sites fall, thus it is regarded as a guideline as to what is likely to occur. The sites sampled are only a very small portion of the whole grid and habitats suitable for certain species in these PRECIS lists may not be present at the sites sampled. It is therefore not unusual for species in the PRECIS list to be absent from the sampling sites
IUCN	The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). Plants and animals that have been evaluated to have a low risk of extinction are classified as Least Concern. (IUCN.org).
CITES	Its aim is to ensure that international trade in specimens of wild animals and

	<p>plants does not threaten their survival (CITES.org).</p> <p>CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species (CITES.org). Specimens are divided into the following appendices according to the restriction on trade.</p>
National Legislation	<p>Of special concern during the field investigations were all protected trees listed by the South African National Forest Act (Act 84 of 1998). All flora and fauna species, listed by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004).</p>
Provincial Legislation	<p>All specially protected (Schedule 2) and protected species (Schedule 3) as listed by Limpopo Environmental Management Act (Act No. 7 of 2003).</p>

5.3 Ecological Sensitivity Assessment

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as meeting biodiversity targets for the country’s variety of ecosystems. These guides are essential to consult for development projects, and will form an important part of the sensitivity analysis. Areas earmarked for conservation in the future, or that are essential to meet biodiversity and conservation targets should not be developed, and have a high sensitivity as they are necessary for overall functioning. In addition, sensitivity analysis in the field based in much finer scale data can be used to ground-truth the larger scale assessments and put it into a more localised context. The following assessments and assignments were taken into account in determining sensitivity:

- The National List of Ecosystems that are Threatened and in need of Protection;
- The National Protected Areas Expansion Strategy;
- The National Spatial Biodiversity Assessment, and
- The National Vegetation Map (Mucina and Rutherford, 2006).

The Sensitivity Assessment was conducted based on desktop studies as well as information obtained during the field investigations. Ecological sensitivity was quantified by subjectively assessing two factors, namely ecological function and conservation importance. These were defined as follows:

Ecological function

Ecological function is rated as described below:

- High ecological function: Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystem integrity (e.g. pristine grasslands, pristine wetlands and pristine ridges);
- Medium ecological function: Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem; and
- Low ecological function: Degraded and highly disturbed systems with little or no ecological function.

Functional Status refers to an indication of the services provided by an area and includes both ecological and human related services. Functional Status depends on the degree to which the area or system still provides a noticeable service.

Conservation importance

Conservation importance is rated as described below:

- High conservation importance: Ecosystems with high species richness which usually provide suitable habitat for a number of threatened species. Usually termed 'no-go' areas and unsuitable for development, and should be conserved;
- Medium conservation importance: Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be accommodated, provided the current species diversity is conserved; and
- Low conservation importance: Areas with little or no conservation potential and usually species poor (most species are usually exotic).

Ecological health is an indication of carrying capacity of an ecosystem and therefore its ability to perform ecological services. In order to adequately gauge the ecological health of the study site it was important to give a qualitative definition of the 'perceived biodiversity value' of the land. This is done at a broad level, to simply categorise the total area of land owned based on potential biodiversity value. Biodiversity Value is understood as being a combination of the conservation status and the functional status of the area.

Conservation Status depends on:

- The amount of the area or system remaining (the extent);
- The diversity in terms of :
 - Proportional species composition of the area of system; and
 - The presence of ecosystems/habitat and species which are endemic, threatened, vulnerable or have particularly high religious/cultural value.
- The degree to which the area or system reflects/represents its original state.

In addition, the data gathered from the field assessment allows for more fine-scale and accurate view of the vegetation in the study area. This data is pivotal for the determination of sensitivity of the area. Based on this approach the total land surface within the project area is categorised into the following biodiversity classes as listed in Table 3 below.

Table 3 : Biodiversity Value Rating

Score	Biodiversity Value	Percentage Score
1	Very High Biodiversity Value	75-100 %
2	High Biodiversity Value	50 – 75%
3	Moderate Biodiversity Value	25-50%
4	Low Biodiversity Value	0 - 25%

3.3.1 Threatened Ecosystems

The list of national Threatened Ecosystems has been gazetted (NEM: BA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion, and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The South African Vegetation Map (Mucina and Rutherford 2006);

- National forest types recognised by the Department of Water Affairs (DWA);
- Priority areas identified in a provincial systematic biodiversity plan, and
- High irreplaceability forest patches or clusters identified by DWAF (Department of Water Affairs and Forestry).

The criteria for identifying threatened terrestrial ecosystems include six criteria overall, two of which are dormant due to lack of data (criteria B and E). The criteria are presented in Table 4 below.

Table 4 : Threatened ecosystem classification

Criterion	Details
A1	Irreversible loss of natural habitat
A2	Ecosystem degradation and loss of integrity
B	Rate of loss of natural habitat
C	Limited extent and imminent threat
D1	Threatened plant species associations
D2	Threatened animal species associations
E	Fragmentation
F	Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

These areas are essential for conservation of the country's ecosystems as well as meeting conservation targets

5.4 Ecosystem Services

Ecosystem system services are the benefits people obtain from ecosystems. This definition is derived from two other commonly referenced and representative definitions:

- Ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the

production of ecosystem goods, such as seafood, forage timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors (Daily 1997); and

- Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions (Costanza et al.).

The primary focus of the ecosystem services assessment in this report is to address the impact of biodiversity loss to the communities within or adjacent to the proposed project boundary. The process adopted was essentially a system based on social-ecological principles developed for the study area through collating information from different specialist studies such as Cultural and Heritage as well as the Flora and Fauna specialist studies. The model considers the supply of ecosystem services (i.e. the ecological component).

An ecosystem services assessment was conducted to establish the supply and demand of ecosystem services within the context of the proposed site. This was essentially an exploratory process to better understand the following:

- The key ecosystem services generated by the natural assets or land cover types within the study;
- The demand for these services based on numbers of users and their dependence on the supply of these services; and
- The potential changes in the supply of services with development of the site and the implications for the users in terms of service level changes.

The demand for ecosystem services within the study area was established through literature review. Review involved identifying provisioning services such as the supply of water, energy/fuel, building materials and food amongst others and establishing the supply of and dependence on regulatory and cultural services.

Exotic and invasive plant species were categorised according to the framework laid out by The Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983). CARA defines weeds as alien plants, with no known useful economic purpose that should be eradicated. Invader plants, also considered by the Act, can also be of alien origin but may serve useful purposes as ornamentals, as sources of timber, or may have other benefits such as medicinal uses (Henderson, 2001). These plants need to be managed and prevented from spreading. Alien and invasive plant species can be grouped three categories:

- Category 1 plants are weeds that serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment. These plants need to be eradicated using the control methods stipulated in Regulation 15.D of the CARA.
- Category 2 plants are plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas.
- Category 3 plants are mainly used for ornamental purposes in demarcated areas but are proven plant invaders under uncontrolled conditions outside demarcated areas.

6. LIMITATIONS

The constraints or limitations to the survey included:

- The time of the winter study did not coincide with the flowering time of most plant species; and faunal activity is generally low during winter when the detailed study took place.
- The majority of threatened plant species are extremely seasonal and only flower during specific periods of the year;
- The majority of threatened faunal species are extremely secretive and difficult to survey even during thorough field surveys conducted over several seasons;
- Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage and EnviroSHEQ Consulting 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.

7. RESULTS & DISCUSSION

7.1 Flora

As aforementioned, the vegetation in the study area is part of the Zeerust Thornveld, which is a component of the Savanna Biome. This vegetation is comprised of a grassy ground layer and an upper layer of woody species.

7.1.1 Vegetation Communities

The study area falls within the Savanna biome (Rutherford & Westfall, 1994) and Mucina & Rutherford (2006) classified the study area as comprised of Zeerust Thornveld, as indicated in Table 6 and Figure 2 below.

7.1.1.1 Savanna Biome

The study area is located in the Savanna Biome, which is the largest biome in Southern Africa, occupying more than 46% of its area, and over one-third of the area of South Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants.



Figure 2 : Vegetation on site

Environmental factors delimiting the biome are complex: altitude ranges from sea level to 2,000m; rainfall varies from 235 to 1,000mm per year; frost may occur and almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. The shrub layer may vary from 1 to 20m in height, but in Bushveld typically varies from 3 to 7m. The shrub tree element may come to dominate the vegetation in areas which are being overgrazed. Summer rainfall is essential for the grass dominance, which, with its fine material, fuels near-annual fires. However, almost all species are adapted to survive fire, usually less than 10% of plants, both in the grass and tree layer, are killed by fire.

Conservation of the Savanna Biome is food in principle, mainly due to the presence of the Kruger and Kgalakgadi Transfrontier Parks and various other large reserves in neighbouring countries. However, this high area conserved in South Africa, belies the fact that half of savanna vegetation types are inadequately conserved, in having less than 5% of their area in reserves. However, much of the area is used for game farming and can thus be considered effectively preserved.

7.1.1.2 Zeerust Thornveld

Table 5 : Vegetation community

Name of vegetation type	Zeerust Thornveld
Conservation Target (percent of area) from NSBA	19%
Protected (percent of area) from NSBA	3.6%
Remaining (percent of area) from NSBA	84.3%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Poorly protected
Area (sqkm) of the full extent of the Vegetation Type	4128.19
Name of the Biome	Savanna Biome
Name of Group (only differs from Bioregion in Fynbos)	Central Bushveld Bioregion
Name of Bioregion (only differs from Group in Fynbos)	Central Bushveld Bioregion

Distribution

The Zeerust Thornveld is distributed in the Northwest province and 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). Altitude mainly 1 000–1 250 m.

Conservation Status

The vegetation community is listed as a Least threatened ecosystem with a conservation target of 19% less than 4% statutorily conserved, spread between four reserves including the Pienaar and Marico Bushveld Nature Reserves. Some 16% transformed mainly by cultivation, with some urban or built-up. A few areas with scattered plants of the alien *Cereus jamacaru* and several other alien species very scattered elsewhere. Erosion is mainly very low to low.

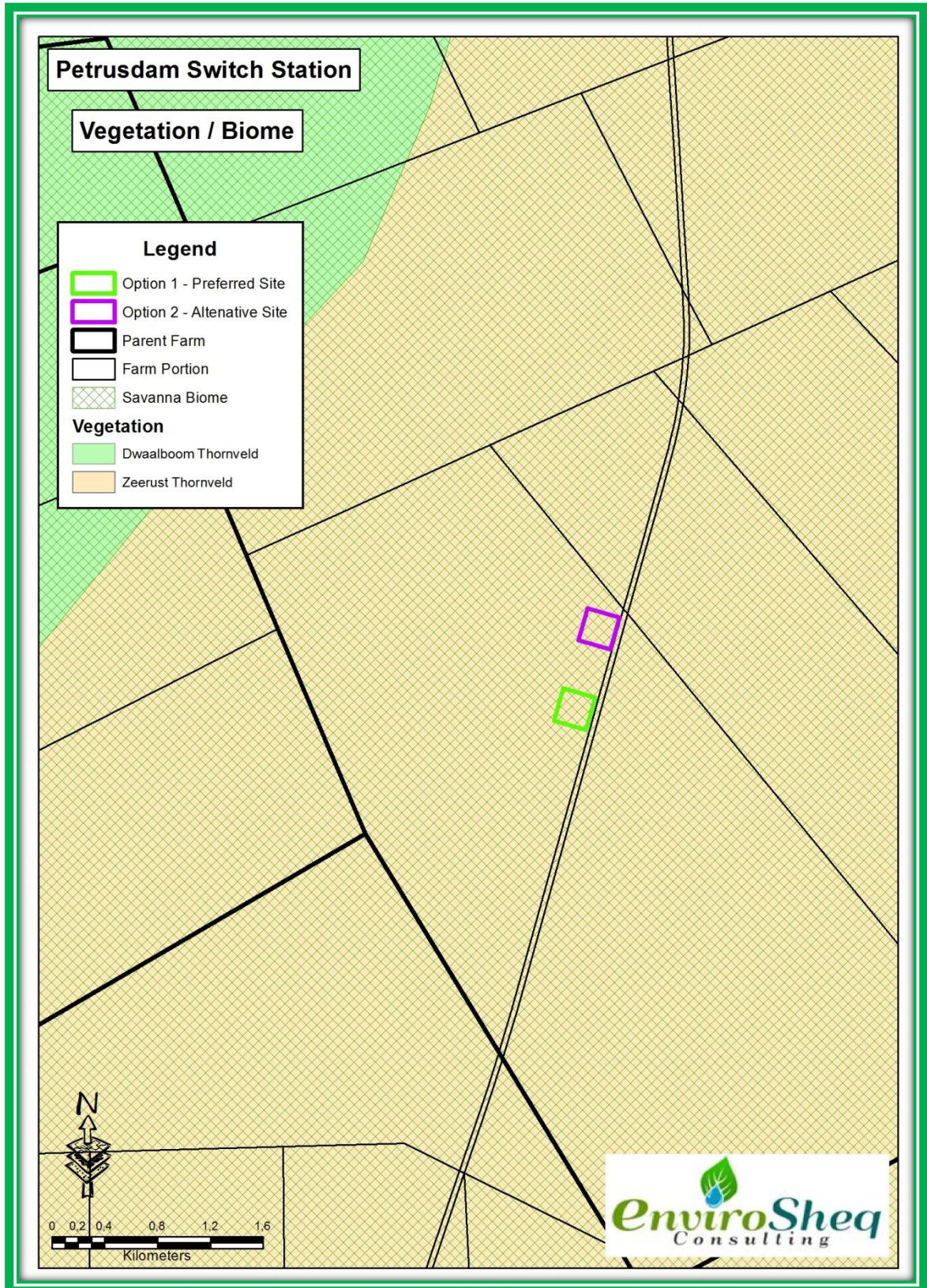


Figure 3 : Vegetation/ Biomes Map

7.1.2 Alien and Invasive Species

Alien invasion for the proposed study area was not regarded as severe and is not regarded as a major hindrance to biodiversity. Alien species in South Africa are categorised according to the Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983) (CARA) and the NEMBA.

Declared alien and invasive species have been divided according to CARA into three categories:

- Category 1: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled, or eradicated where possible;
- Category 2: Declared invader species that are only allowed in demarcated areas under controlled conditions and prohibited within 30m of the 1:50 year flood line of any watercourse or wetland; and
- Category 3: Declared invader species that may remain, but must be prevented from spreading. No further planting of these species are allowed.

In addition, draft NEMBA Regulations (Government Gazette Vol. 526, No. 32090) was issued on the 3rd of April 2009. Although these regulations are yet to be promulgated as law, they are useful and relevant for categorising alien plant species found on site in this study. The draft NEMBA categories for invasive species according to Section 21 are as follows:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

Certain species have different alien invasive categories for different provinces in South Africa. Table 6 below lists the alien species identified on site as well as their respective alien categories.

Table 6 : Recorded Alien and Invasive Species

Family	Species Name	Common Name	Category
Asteraceae	<i>Bidens Pilosa</i>	Black-Jack	-
Asteraceae	<i>Solanum incanum</i>	Thorn Apple	-
Cactaceae	<i>Opuntia ficus-indica</i>	Prickley pear	1

7.2 Fauna

Fauna expected to occur on site include assemblages within terrestrial ecosystems: mammals, birds and reptiles. Each of these assemblages occur within unique habitats, the ecological state of these habitats directly relates to the number of species found within them. The main habitats occurring in the project area are bushveld plains.

7.2.1 Mammals

For a desktop review of mammals that could possibly occur within the project area, SIBIS was used. SIBIS is part of SANBI's Integrated Biodiversity Information System. Animal species that were previously recorded within the North-West Province and the project area can be seen in Appendix section. The list also indicated the global and national IUCN status, as well as the NEMBA status. By making a comparison between the previously recorded species list and the observed species found during the field survey, the magnitude of impacts resulting in species reduction or loss can be estimated.

The Red Data species considered for this survey can be seen in appendices section. The probability of occurrence was estimated based on habitat requirement and distribution. Protected species of North West Province under were also considered. Amongst these listed; none were found to have a high probability of occurrence within the project area.

7.2.2 Herpetofauna

No Red Data status reptiles were found during the surveys. The probability of occurrence was determined based on the distribution and habitat requirements. The Red Data species and a complete list of reptiles expected to occur on site can be viewed in Appendix section.

7.3 Biodiversity Value Assessment

7.3.1 Species of Special Concern

7.3.1.1 Flora

Species identified by the PRECIS data for the grid squares 2526AA can be seen in appendix section. None of the Red Data species were identified during the field survey, however the National Forests Act, 1998 (Act No. 84 of 1998) was also taken into consideration.

In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Water Affairs and Forestry (now Department of Agriculture, Forestry

and Fisheries) developed a list of protected tree species. In terms of Section 15(1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. The protected trees that have a geographical distribution (Central Bushveld) that includes the two sites are as listed in the table below:

Table 7 : Protected Tree species of the Central Bushveld flora (IUCN categories: LC = Least Concern, NT = Near Threatened, VU = Vulnerable). Source: DWAF (2011).

Protected Tree Species	Common Name	Red List status
<i>Acacia erioloba</i>	Camel thorn	Declining
<i>Adansonia digitata</i>	Baobab	LC
<i>Boscia albitrunca</i>	Shepherd's tree	LC
<i>Combretum imberbe</i>	Leadwood	LC
<i>Elaeodendron transvaalense</i>	Bushveld saffron	NT
<i>Erythrophysa transvaalensis</i>	Bushveld red balloon	LC
<i>Pittosporum viridiflorum</i>	Cheesewood	LC
<i>Prunus africana</i>	Red stinkwood	VU
<i>Sclerocarya birrea subsp. caffra</i>	Marula	LC
<i>Securidaca longepedunculata</i> var. <i>longepedunculata</i>	Violet tree	LC

Seven protected tree species were recorded on the area surveyed and only one protected tree was found to fall within the preferred site. Two species recorded on site were *Acacia Erioloba* and *Boscia albitrunca*, as shown by the table and map below.

Table 8 : Protected tree species coordinates

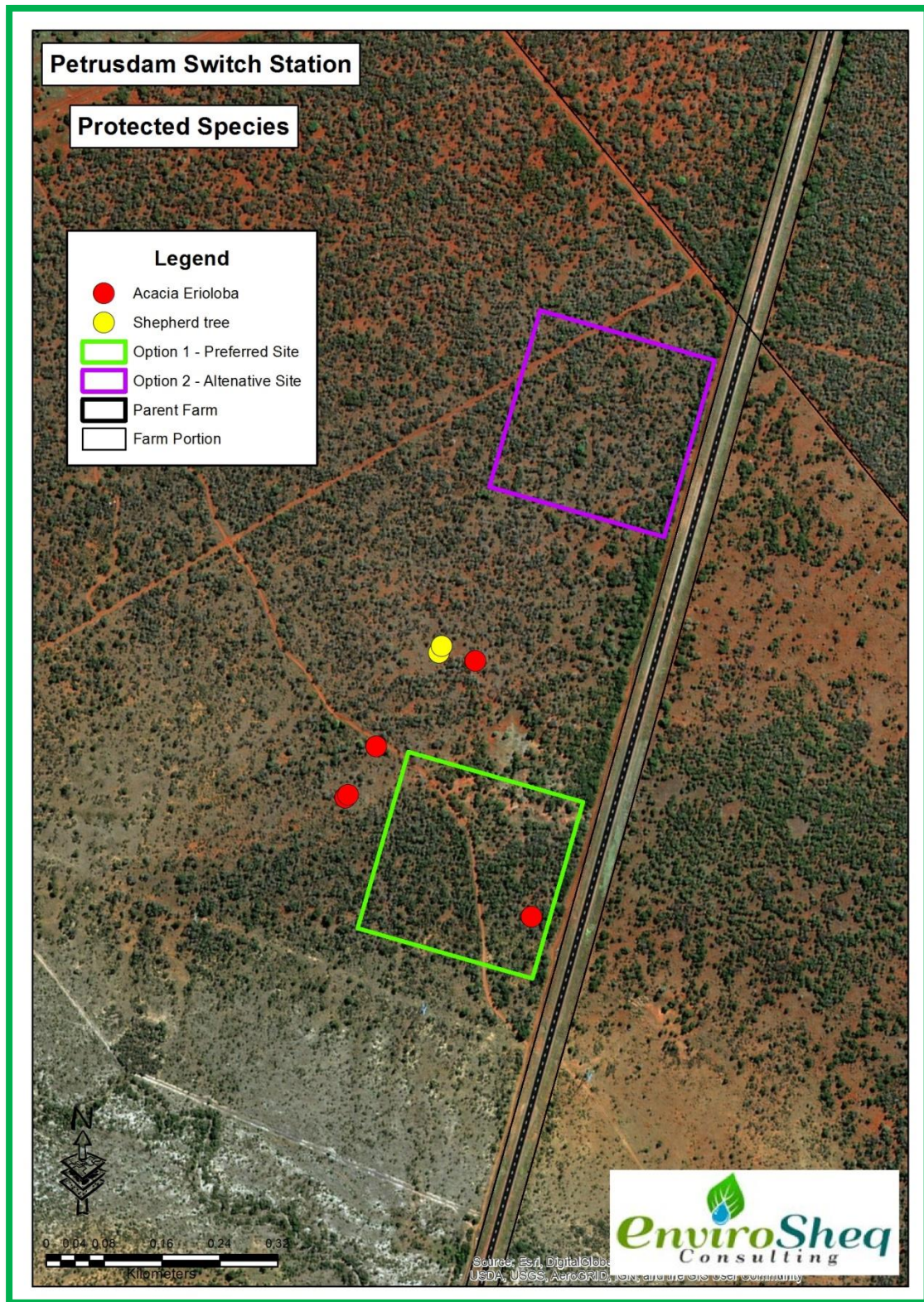
Protected Tree Species	Coordinates
<i>Acacia Erioloba</i>	S25°09.995' , E 026°08.831
	S25°09.906' , E 026°08.692
	S25°09.904' , E 026°08.694
	S25°09.868' , E 026°08.715
	S25°09.804' , E 026°08.789
<i>Boscia albitrunca</i>	S25°09.798' , E 026°08.762
	S25°09.798' , E 026°08.762



Figure 4: *Acacia Erioloba*



Figure 5 : *Boscia albitrunca*



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Figure 6 : Distribution of recorded protected tree species

5.1.1.1 Plant Species with ethnobotanical uses

Ethnobotany is a branch of botany that places focus on the use of plants for medicines and other practical purposes. The use of native plants for ethnobotanical uses can be detrimental to populations that are overexploited. South Africa has a rich diversity of medicinal plants that not only have a global significance, but also have a cultural and historical role (van Wyk et al. 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors.

From the list of plant species identified during the field surveys there are 3 species (Table 8) that have cultural uses. Medicinal plants are important to many people and have been used traditionally for centuries to cure many ailments. Plants have also been used traditionally for other cultural uses, such as building material, and for spiritual uses such as charms.

Table 9 : Recorded Species with ethnobotanical uses

Species Name	Common Name	Uses
<i>Acacia caffra</i>	Common Hook Thorn	Dye and tanning
<i>Acacia karroo</i>	Sweet Thorn	Dyes and tanning
<i>Bidens pilosa</i>	Black Jack	Herbs

7.4 Ecological Sensitivity Assessment

7.4.1 Ecological Support Areas 1 & 2

The North West Department of Agriculture, Conservation, Environment and Rural Development have defined areas in the province which is considered Critical Biodiversity areas (CBA) (2009). The two proposed sites fall outside CBA's. CBA's are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. As indicated in the map below, Figure 6, the two alternative sites fall within the ecological support areas (ESA's) (buffer areas). These 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. This includes for example 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."

Table 10: Conservation Class (CBAs & ESA)

CBA category	Land Management Objective
Ecological Support Areas (ESA)	<p>Functional landscapes:</p> <ul style="list-style-type: none"> • 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.

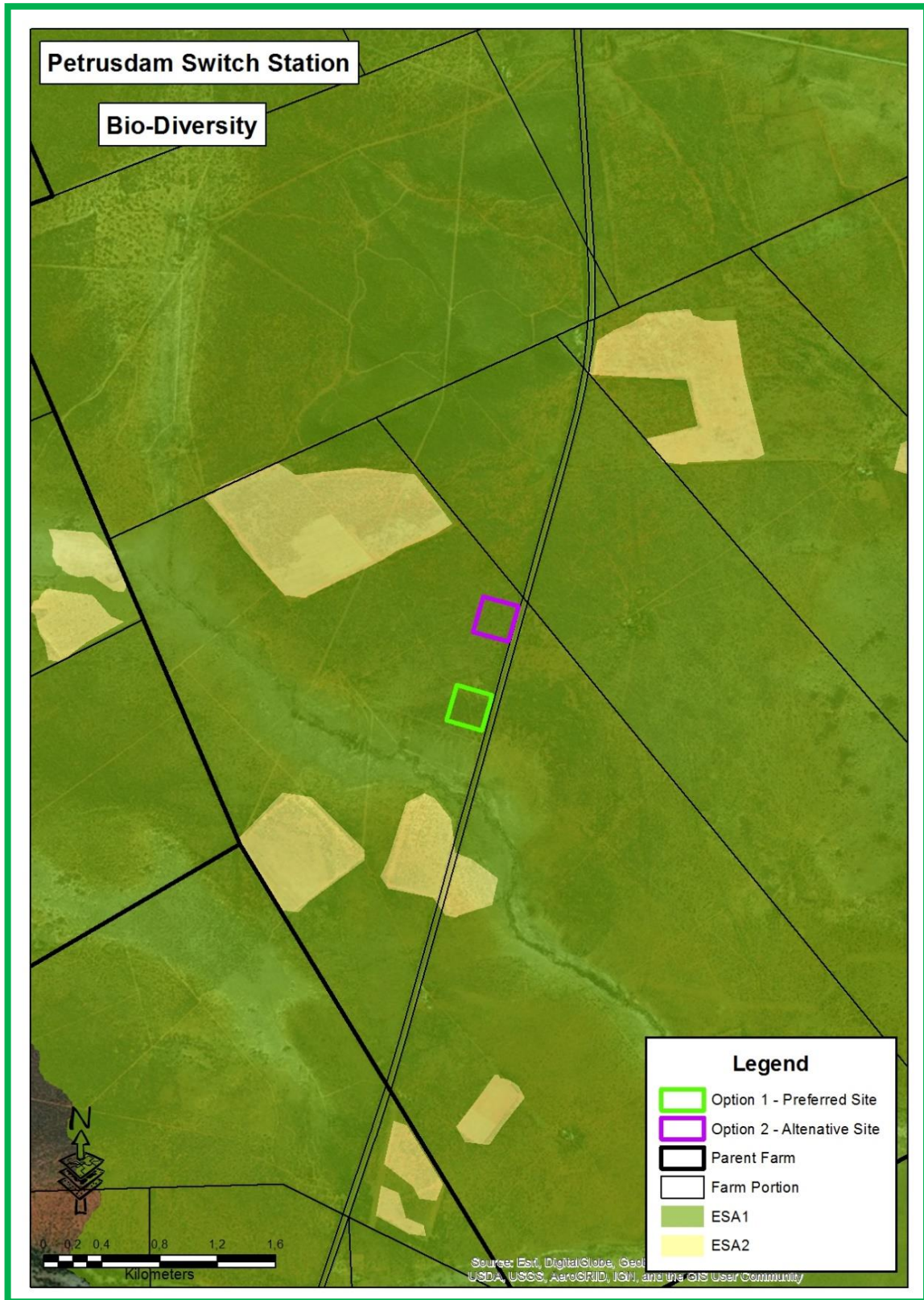


Figure 7 : Ecological Sensitivity Assessment

7.4.2 Nationally Threatened Ecosystems

The National threatened ecosystems list (NEMBA) was referenced in order to ascertain the level of ecosystem threat of the ecosystems present within the study area. The list of national Threatened Ecosystems has been gazetted (NEMBA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion; and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the DWAF;
- Priority areas identified in a provincial systematic biodiversity plan; and
- High irreplaceability forest patches or clusters identified by DWAF.

The conclusion in this respect is that the study site does not fall within any demarcated National Threatened Ecosystems.

7.4.3 National Protected Areas Expansion Strategy (NPAES)

The NPAES are areas designated for future incorporation into existing protected areas (both National and Informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning. The proposed switch station site falls outside of any National Protected Areas and is not in close proximity to any National Protected Area

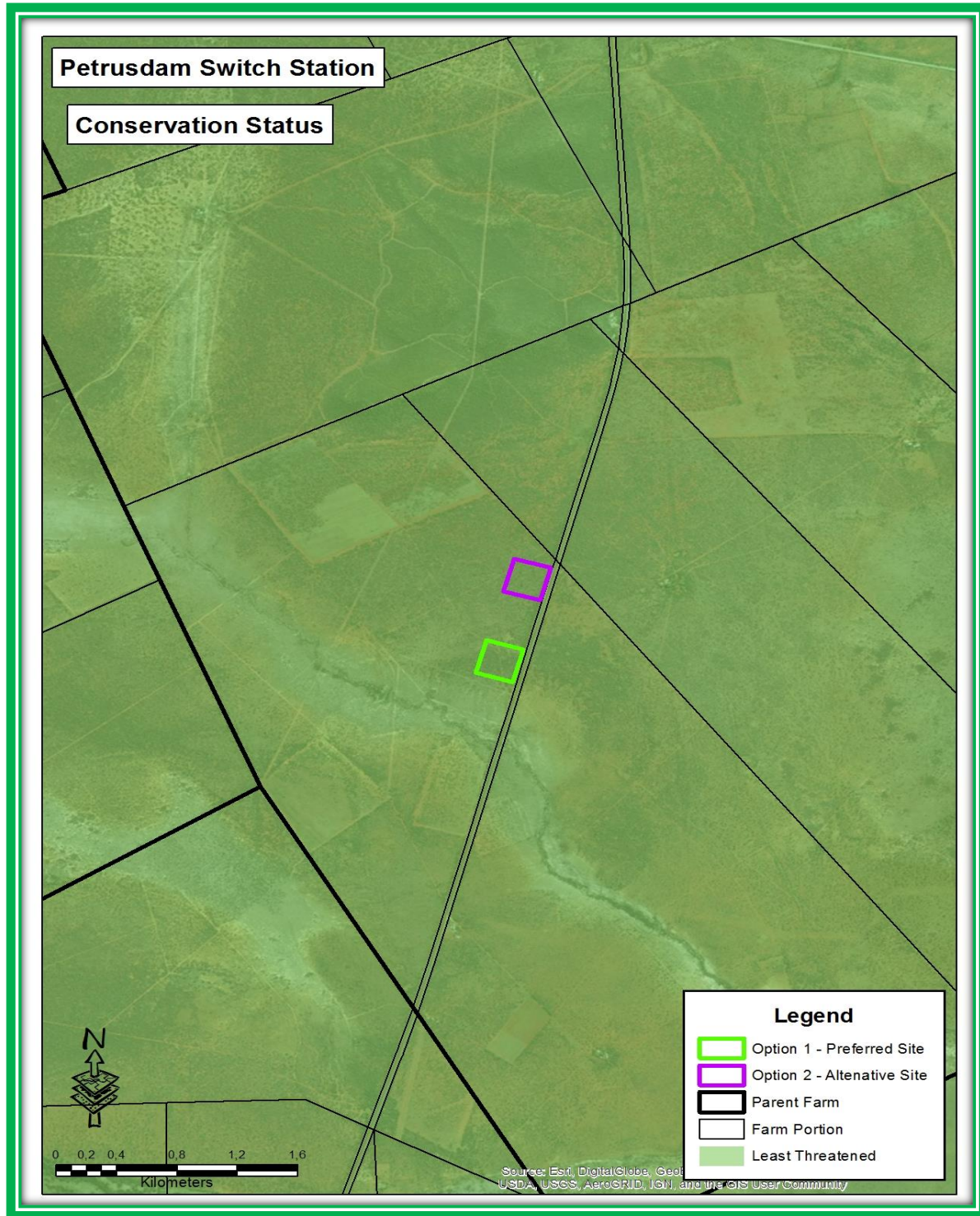


Figure 8 : Conservation Status

7.5 Biodiversity Value Assessment

The biodiversity value or sensitivity assessment takes into account all of the plans mentioned above (Threatened Ecosystems and NPAES), as well as the field data gathered during the site visits. The outcome of these assessments is one sensitivity map, incorporating vegetation and flora and fauna. A moderate biodiversity value was assigned to the ecosystem owing to the ecosystem services provided by the ecosystem.

8. ENVIRONMENTAL IMPACT ASSESSMENT

8.1 Methodology

Potential environmental impacts were analyzed with regard to their nature, extent, magnitude, duration, probability and significance. The following definitions and scoring system was applied to determine the significance of the impact likely to be incurred by the receiving environment with regards to the proposed project:

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	Site	1
	Local	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	≤20
	Low	>20 ≤40
	Moderate	>40 ≤60
	High	>60

Impacts / Issues	Score before mitigation					Development phase -Pre-construction			Score after mitigation				
	P	D	S	M/S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M/S	S
Planning & Environmental Awareness	5	1	1	8	+50	<ul style="list-style-type: none"> Minimise negative impacts through the implementation of environmental monitoring Formalise environmental responsibilities Legislative compliance 	<ul style="list-style-type: none"> Contracts in place Site documentation including EMP, EA and method statements are in place 	<ul style="list-style-type: none"> Appointment of ECO and other role players All role-players must understand their part in the implementation of the mitigation contained in this specialist report and in the EMP Required method statements are compiled and approved Any licences and/or permits required have been obtained eg tree cutting permits from DWAF All identified protected tree species should be marked within the project footprint Establish procedures to effectively verify and address complaints and claims received. Complaints or liaisons with landowners with regard to environmental matters must be recorded, reported to the correct person and a record of the response is to be entered in the complaints register. Establish lines of communications with landowners. Provide relevant contact details to landowners for queries / raising of issues or complaints. Landowners will be kept up to date with projected construction durations on their properties. 	5	3	1	8	+60

Impacts / Issues	Score before mitigation					Development phase -Pre-construction			Score after mitigation				
	P	D	S	M/S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M/S	S
Site preparation:	5	5	1	8	-70	<ul style="list-style-type: none"> Clear indication of construction footprint Avoid/reduce impacts on surrounding environment, infrastructure and services 	<ul style="list-style-type: none"> Method statement detailing location and management of all access points and roads. Method statement regarding establishment and management of construction camp 	<ul style="list-style-type: none"> Soil and vegetation to be stripped only from project footprint area No-go areas (if any) to be clearly fenced off Construction camp to be clearly demarcated including all Contractor's buildings, lay down areas, etc All identified protected tree species should be marked within the project footprint All employees should be educated on identifying protected tree species A qualified and / or appropriately experienced Botanist or an experienced person who knows specific vegetation types well should mark any species of conservation importance other medicinal plants when the site is pegged. All medicinal, protected or red data listed species should be marked prior to the clearing of vegetation. species survival. Workers must be educated to recognize markers on plants. Sensitive environmental features must be identified, mapped and demarcated as no-go zones, 	2	1	1	2	-8
Method statements	5	3	1	6	+50	<ul style="list-style-type: none"> Protocols to minimise negative impacts on the environment 	<ul style="list-style-type: none"> Approved method statements in place 	<ul style="list-style-type: none"> Contractor to supply method statements for the clearing of vegetation on site. The ECO must approve before vegetation is cleared on site. 					

Impacts / Issues	Score before mitigation					Development phase -Pre-construction			Score after mitigation				
	P	D	S	M/S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M/S	S

Impacts / Issues	Score before mitigation					Development phase –Construction Phase			Score after mitigation				
	P	D	S	M/S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M/S	S
Loss of plant communities, natural habitats and fragmentation thereof	5	3	2	6	55	<ul style="list-style-type: none"> Minimise impacts on vegetation during construction process Keep within construction footprint 	<ul style="list-style-type: none"> Impacts to vegetation and soil beyond what is necessary are avoided. 	<ul style="list-style-type: none"> Ensure that workers and machinery do not unnecessarily trample vegetation. All infrastructures should be confined to the areas demarcated for such and no infrastructure should be permitted in areas not correctly prepared. The project should retain as small footprint as possible to minimise impacts to surrounding vegetation and soil. All areas not within the footprint of the project area where soil has been compacted or vegetation disturbed should be immediately ripped and re-vegetated immediately. 	2	3	1	2	12

Impacts / Issues	Score before mitigation					Development phase –Construction Phase			Score after mitigation				
	P	D	S	M / S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M / S	S
								<ul style="list-style-type: none"> Careful planning of access roads in order to prevent excessive removal of trees and prevent soil erosion. No collection of firewood may be allowed. Topsoil will only be removed off areas proposed for access roads. All soils should be stored and managed correctly for rehabilitation. Rehabilitate all temporarily access roads by replacing topsoil and scarring compacted earth to allow seedlings to take root. When possible make use of existing roads rather than creating new access routes. 					
Loss of vegetation and seed bank and fauna due to fires caused by oil and diesel spillages	5	3	2	6	55	<ul style="list-style-type: none"> Prevent pollution of environment Minimising occurrence of such impacts 	<ul style="list-style-type: none"> No oil spillages No damage due to oil spillages Comprehensive method statement addressing handling and storage of oil and emergency spills procedure 	<ul style="list-style-type: none"> Ensure that proper measures are in place to contain any oil and diesel leakages or spills. Proper handling and storage practices, as well as readily available oil-spill kits should minimise the risks associated with such spills. Spills should be cleaned up immediately by removing the polluted soil and disposing thereof at an appropriate 	2	1	1	2	6

Impacts / Issues	Score before mitigation					Development phase –Construction Phase			Score after mitigation				
	P	D	S	M / S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M / S	S
								<ul style="list-style-type: none"> registered waste facility Drip trays to be placed under vehicles that stand for more than 24 hours. Size of drip trays must be sufficient to contain the amount of oil in the vehicle Suitable covered containers should be provided for disposal of waste. All used oils, grease or hydraulic fluid should be placed therein and these containers should be removed from the site on a regular basis for disposal at an appropriate registered waste facility. 					
Increased potential of invasion by alien invasive species	4	3	2	6	44	<ul style="list-style-type: none"> Avoid legal infringements by preventing spread of alien vegetation 	<ul style="list-style-type: none"> No noticeable spread of alien vegetation on site 	<ul style="list-style-type: none"> Early detection and eradication of alien vegetation species through on-going monitoring and eradication programme Control and manage the removal of vegetation. Vegetation removal to be undertaken in consultation with the ECO Encroachment of alien vegetation should be monitored regularly and controlled; the area must be kept clear of all invader plants as per the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983). 	2	1	1	2	8

Impacts / Issues	Score before mitigation					Development phase –Construction Phase			Score after mitigation				
	P	D	S	M / S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M / S	S
								Rehabilitation measures must be employed until such a time as indigenous species are established. If herbicides are used then correct licenses and permits must be acquired prior to use.					
Fauna Protection & Search and Rescue	4	3	2	6	44	<ul style="list-style-type: none"> Minimise disturbance and mortality to animals and birds 	<ul style="list-style-type: none"> No loss of faunal species 	<ul style="list-style-type: none"> Workforce to be instructed that no animals or birds may be caught or killed Workforce to be informed that poaching is illegal and if they are caught poaching they will be dismissed Construction vehicles to keep to speed limits to limit killing animals and birds on site Construction activities to take place during daylight hours to reduce risks to faunal species A qualified and / or appropriately experienced Zoologist or an experienced person who knows the animals in the region well will identify any possible Red Data fauna on site and the necessary permits to relocate fauna will be obtained if avoidance is not possible. Training of construction workers to recognize threatened animal species will reduce the 	2	1	1	2	8

Impacts / Issues	Score before mitigation					Development phase –Construction Phase			Score after mitigation				
	P	D	S	M / S	S	Management objectives	Management targets	Mitigation measures	P	D	S	M / S	S
								<p>probability of fauna being harmed unnecessarily.</p> <ul style="list-style-type: none"> Barricading measures to be utilised should not restrict the movement of the fauna in the area. 					
Fire	4	1	2	8	44	<ul style="list-style-type: none"> Maintain safety on site and in surrounding environment Reduce risk of veld fires and destruction of natural habitat 	<ul style="list-style-type: none"> No veld fires started by the workforce No claims from landowners for damages due to veld fires Method statement in place and adhered to 	<ul style="list-style-type: none"> No open fires are to be permitted on-site. Method statement by Contractor that indicates how wild fires will be dealt with from adjacent properties. Fire breaks should be done in accordance with the station's fire breaks procedure. Sufficient fire extinguishers and other fire-fighting equipment to be supplied in construction area 	2	1	1	2	8
Dust-Vegetation disturbance due to increased dust during construction phase	4	3	2	2	28	<ul style="list-style-type: none"> Minimise dust disturbance 	<ul style="list-style-type: none"> Method statement regarding dust control in place 	<ul style="list-style-type: none"> Wetting down of work areas can be used to reduce dust levels but not to a degree that causes runoff and contamination. Cultivate awareness among personnel to limit excessive and unnecessary dust. Maintain speed control measures on access roads through construction of speed bumps and speed limit signs. 	2	1	1	2	8

Impacts / Issues	Score before mitigation					Development phase –Decommissioning Phase			Score after mitigation				
	P	D	S	M/S	S	Management objectives	Management targets	Mitigation measures					
Rehabilitation of Vegetation	5	1	1	8	55	<ul style="list-style-type: none"> Minimise exposed areas Appropriate plants are used for re-vegetating Reduce risk of spread of invasive species 	<ul style="list-style-type: none"> Exposed areas are rehabilitated quickly to reduce loss of soil Area is rehabilitated to surrounding area standard No signs of invasive species on rehabilitated areas 	<ul style="list-style-type: none"> Topsoil removed during the construction phase must be used where possible to rehabilitate disturbed areas; Topsoil must be analysed for its fertility and if reduced, appropriate fertilisers must be used to increase the fertility of the soil prior to rehabilitation. Re-vegetate the area with plant species consistent surrounding environment and under guidance of a qualified ecologist. Methods and timing of rehabilitation must be prescribed by an ecologist based on site conditions at the time 	5	3	1	8	+60

							<ul style="list-style-type: none"> • Badly damaged areas should be fenced off to allow the area to rehabilitate. • Remove invasive vegetation from damaged construction area and from rehabilitated areas • Manual labour to be used to remove alien plant species instead of chemical removal 					
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9. CONCLUSION

The proposed construction of a new 88kV switch station on farm Roode Kopjes Put 32 JP Portion 14 approximately 40 km from Zeerust in Ramotshere Moiloa Local Municipality in North West Province is likely not to cause any major disturbance to the flora and fauna should the mitigation measures contained herein and other reports be observed. During desktop and field surveys, it was observed that the entire area falls within the Zeerust Thornveld under the Savanna Biome. The site falls within an Ecological Support Area (ESA) and vegetation community conservation status was classified as the Least Threatened Ecosystem

Two protected tree species (*Acacia Erioloba* and *Boscia albitrunca*) as listed in the National Forests Act 1998 (Act No 84 of 1998) were recorded during the field investigation. The site biodiversity value assessment was classified as of moderate value in line with the methodology applied. As such, this reports recommends that the Switching Station be built on Alternative site 2 (purple block) in order to preserve the *Acacia Erioloba* and *Boscia albitrunca*.

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