Strategic Biodiversity Impact Assessment for the proposed Medupi Conveyor & Silo on the farms Enkelbult and Turfvlakte 463-LQ, Lephalale

submitted by

BEC
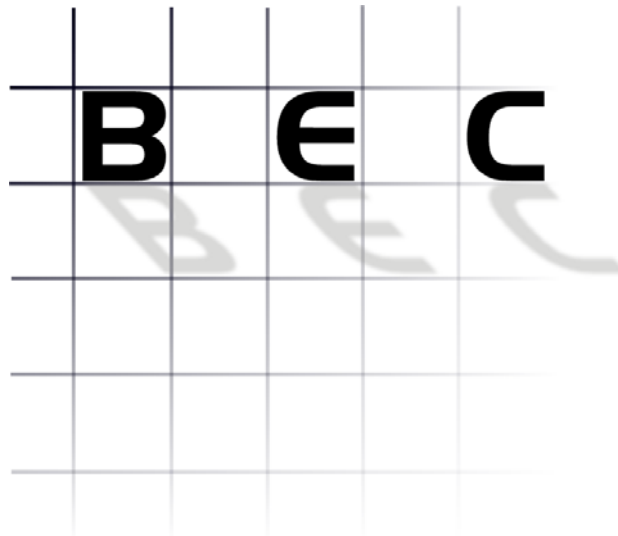
March 2010

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I   SPECIALIST INVESTIGATORS

The Natural Scientific Professions Act of 2003 aims to '*provide for the establishment of the South African Council of Natural Scientific Professions (SACNASP), and for the registration of professional, candidate and certified natural scientists; and to provide for matters connected therewith*'.

Quoting the Natural Scientific Professions Act of 2003: '*Only a registered person may practice in a consulting capacity*' (20(1) – pg 14).

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II   DECLARATION

All specialist investigators, project investigators and members of companies employed for the purpose of conducting this particular investigation declare that:

- we consider ourselves bound to the rules and ethics of the South African Council for Natural Scientific Professions;
- at the time of completing this report, we did not have any interest, hidden or otherwise, in the proposed development as outlined in this document, except for financial compensation for work done in a professional capacity;
- we will not be affected in any manner by the outcome of the environmental process of which this report forms part of, other than being part of the general public;
- we do not have any influence over decisions made by the governing authorities;
- we do not necessarily object to or endorse the proposed development, but aim to present facts and recommendations based on scientific data and relevant professional experience; and
- should we consider ourselves to be in conflict with any of the above declarations, we shall formally submit a Notice of Withdrawal to all relevant parties and formally register as an Interested and Affected Party.

III   GLOSSARY OF TERMS

Alternatives: A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Biome: Any major ecological community of organisms, usually characterized by a dominant vegetation type.

Cumulative impacts: The combined or additive effects on biodiversity or ecosystem services over time or in space. They may seem to be insignificant when seen in isolation, but collectively they have a significant effect

Direct impacts: Those that take place at the same time and in the same space as the activity, e.g. clearing of natural vegetation for agriculture.

Direct, **indirect and cumulative impacts**: Decision makers need to know the direct, indirect and cumulative impacts of a proposed activity on the environment, if they are to take informed decisions in line with sustainable development.

Ecologically sensitive ecosystem: One where relatively even minor disturbances may result in substantial and significant changes.

Ecosystems: Include living (e.g. plants, animals) and non-living (e.g. minerals, soil, water) components, which can be defined in terms of distinguishing characteristics (e.g. a wetland ecosystem, a freshwater ecosystem, a terrestrial ecosystem, a forest ecosystem, etc.).

Endemic or range-restricted species or ecosystem: One whose distribution is confined to a particular and often very limited geographical region.

Environment: Broadly covers our surroundings and the characteristics of those surroundings that influence our health and wellbeing. That is, the environment includes all living organisms (plants, animals and other life), the physical environment (land, water and air), as well as social, economic and cultural conditions. Sometimes we speak of 'the natural environment' and 'the built environment', to differentiate between natural and man-made systems.

Epihydate: A plant that grows on another plant but without deriving nourishment from it and not parasitic, as some ferns and orchids growing on trees.

Habitat: The place or type of site where an organism or population naturally occurs.

Helophyte: A biennial or herbaceous plant of which only the buds survive a harsh period, such as winter.

Hydrophyte: A plant that only grows wholly or partly submerged in water.

Indigenous: Native to a particular area.

Impact assessment: A process that is used to identify, predict and assess the potential positive and negative impacts of a proposed project (including reasonable alternatives) on the environment and to propose appropriate management actions and monitoring programmes. Impact assessment is used to inform

decision-making by the project proponent, relevant authorities and financing institutions. The process includes some or all of the following components: screening, scoping, impact assessment and decision-making.

Indirect impacts: Occur later in time or at a different place from the activity, e.g. extraction of groundwater for irrigation leads to changes in the water table and affects distant water users.

Irreplaceable loss: When it results in the loss of a resource without substitute, and which cannot be replaced. An impact leading to irreplaceable loss of biodiversity is, by definition, irreversible

Irreversible impact: One that arguably cannot be reversed in time (e.g. decrease in area of a specific vegetation type, loss of genetic diversity through reduction in size of populations of a particular species). Some, but not all, irreversible impacts will lead to irreplaceable loss of biodiversity. They may, or may not, be acceptable to society or stakeholders in terms of their current values

Issue: A context-specific question that asks "what, or how severe, will the impact of some activity/aspect of the development be on some element of the environment?"

Natural resources: Include living and non-living materials that can be exploited or used by people. Natural resources form part of ecosystems, and our living natural resources contribute to biodiversity. Some people use 'natural resources' to mean the same thing as biodiversity or ecosystem services.

Precautionary Principle: States that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Protected area: As defined by National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003).

Protected species or ecosystem: One that is protected by law from particular activities and land uses.

Red Data Book' or 'Red List': Provides information on threatened species.

Significance: A term used to evaluate how severe an impact would be, taking into account objective or scientific data as well as human values. A specific significance rating should not be confused with the acceptability of the impact (i.e. an impact of low significance is not automatically "acceptable").

Species: A group of plants, animals, micro-organisms or other living organisms that are morphologically similar; that share inheritance from common ancestry; or whose genes are so similar that they can breed together and produce fertile offspring.

Suffrutex: A low-growing woody shrub or perennial with woody base.

Sustainable development: Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations, or improving the quality of human life while living within the carrying capacity of supporting ecosystems".

Threatened species or ecosystem: Species/ Ecosystems that are at risk of going extinct in its natural range. It may be 'critically endangered' at extremely high risk, 'endangered' at very high risk, or 'vulnerable' at high risk. Species or

ecosystems at low or no risk are not 'threatened', and fall into the 'near threatened' or 'least concern' categories.

IV   LEGISLATION

Compliance with provincial, national and international legislative aspects is strongly advised in the planning, assessment, authorisation and execution of this particular project. In the compilation of this report, the following legislative aspects were taken into consideration, but were not necessarily limited to:

- Biodiversity Act (No. 10 of 2004);
- Conservation of Agricultural Resources Act 43 of 1983;
- Constitution of the Republic of South Africa (Act 108 of 1996);
- Convention on Biological Diversity, 1995;
- Convention on International Trade in Endangered Species of Wild Life and Fauna;
- Environmental Conservation Act (No. 73 of 1989);
- National Environmental Management Act (No. 107 of 1998);
- National Forests Act, 1998 (No 84 of 1998);
- Protected Areas Act (No. 57 of 2003); and
- White Paper on the conservation and sustainable use of South Africa's biological diversity.

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1   EXECUTIVE SUMMARY

The aim of this document is to provide the reader with a broad understanding of the floristic and faunal attributes and sensitivities of the natural environment that will be affected by the proposed activity. This biodiversity assessment forms part of an environmental impact assessment of the proposed development area, situated near Lephalale, Limpopo Province. The proposed line comprises approximately 4.5km between Grootegeluk Mine and the new Medupi Power Station.

Bathusi Environmental Consulting (BEC) was appointed as independent specialist consultants to conduct this Biodiversity Impact Assessment. A site assessment was conducted on the 25th March 2010.

1.1   Biophysical Environment

The central part of the proposed servitude crosses an alluvial plain which will be affected by the proposed development. This type of plain is formed over a long period of time by a river depositing sediment on its floodplain or bed which becomes alluvial soil. The status of this area is regarded relatively degraded and it would appear as if flow periods are extremely sporadic, most likely only after exceptional periods of rain. An informal constructed drainage channel is present in the central northern section of the proposed servitude. Standing water infrequently collects in the transformed mining areas in the northern section of the proposed servitude. A natural pan is situated approximately 500m to the west of the line in the southern section. It is unlikely that this area will be affected directly by the proposed development, however, movement patterns of fauna species utilising this area is likely to be affected.

Two main land cover categories are represented, namely mining areas and natural woodland. The major form of land transformation in the region is the result of mining (opencast coal mining), with limited agriculture and urban areas. Natural woodland areas are presently in a relative undisturbed status.

The ENPAT database indicates that the study area does not comprise any area where significant slopes are present; land type information furthermore indicates that slopes in the region generally vary between 0 and 3%. This was also confirmed during the site investigation. The general topography is described as 'Plains', defined an area formed from the deposition of alluvium usually adjacent to a river that periodically overflows. It is also described as any relatively level area that exhibits gentle slopes and small local relief (differences in elevation).

The study area is situated within the Limpopo Sweet Bushveld vegetation type. This vegetation type, although poorly protected (0.6%) in formal conservation areas, is largely untransformed (± 94.9%) and is therefore considered to be Least Threatened.

1.2   Floristic Attributes

The SANBI database indicates the presence of 317 plant species within the 2327DA ¼ degree grid in which the study area is located. A total of 72 plant species were identified during the site investigation.   The physiognomy is typical of a woodland area that is dominated by the shrub and tree stratum. The diversity of plant species within the study area is represented by 28 plant families, dominated by Poaceae, Mimosaceae and Combretaceae.

Results of the photo analysis and site investigations revealed the presence of the following floristic habitat types:
*   Acacia – *Eragrostis stipitata* Sandveld (25.3%, 35 species, Medium Floristic Sensitivity);
*   Closed *Acacia erioloba* Woodland (13.6%, 29 species, High Floristic Sensitivity);
*   *Flaveria bidentis* Alluvial Plain (10.7%, 23 species, Medium-high Floristic Sensitivity);
*   Mixed Acacia Veld (28.6%, 48 species, Medium Floristic Sensitivity); and
*   Transformed Habitat (21.8%, Low Floristic Sensitivity).

SANBI records for the region indicate the presence of 3 Red Data flora species. None of these species were observed during the site investigations and available habitat in the study area are not considered suitable for these particularly species. The protected trees *Acacia erioloba* (Camel Thorn) and *Combretum imberbe* (Leadwood) are present throughout the region; a particular dense stand of *Acacia erioloba* is present in the Closed *Acacia erioloba* Woodland unit. It is also considered highly likely that *Boscia albitrunca* (Shepard's Tree) and Marula (*Sclerocarya birrea*) are present in the area, although not noted during the surveys.

The exceptionally high density of *Acacia erioloba* trees within the Closed *Acacia erioloba* Woodland resulted in a high floristic sensitivity, while the association with the *Flaveria bidentis* Alluvial Plain with temporarily inundated soil conditions resulted in a medium-high floristic sensitivity of this unit.

1.3   Faunal Attributes

The aim of the faunal assessment is to present the reader with a description of the general faunal ecology and biodiversity of the study area in terms of observed species, Red Listed probabilities and the inherent faunal sensitivity of the observed ecological units.   This assessment also compares relative faunal sensitivities of the observed faunal habitat types present in the study area; these sensitivities based on estimated ecological and conservation potential of each area.

The proposed conveyor servitude includes areas that differ significantly in ecological potential and biodiversity contribution, mainly as a result of habitat transformation. Results

of the photo analysis and site investigations revealed the presence of the following floristic habitat types:

- Acacia – *Eragrostis stipitata* Sandveld (Medium faunal sensitivity);
- Closed *Acacia erioloba* Woodland (Medium-high faunal sensitivity);
- *Flaveria bidentis* Alluvial Plain (High faunal sensitivity);
- Mixed Acacia Veld (Medium faunal sensitivity); and
- Transformed Habitat (Low faunal sensitivity).

- A total of 13 of the butterflies listed for the 2327DA Q-grid were observed in the study area. No red data species are known from this specific Q-grid;
- A total of 17 frog species are listed for the 2327DA Q-grid, including one Red Data species, *Pyxicephalus adspersus* (NT), which is estimated to have a moderate-low probability of occurring in the study area. Four species have a moderate-low probability of occurring, 5 species a moderate and 6 species a high probability;
- A total of 18 reptile species are listed for the 2327DA Q-grid (no Red Data species). One species was confirmed in the study area. A high likelihood of occurring in the study area is estimated for the remaining 17 reptile species;
- A total of 394 bird species are listed for the 2327DA Q-grid, including 30 Red Data species including 16 Near Threatened, 13 Vulnerable and one Endangered (*Ephippiorhynchus senegalensis*). Twenty-three bird species were observed during the site investigation; and
- A total of 68 mammal species is listed for the 2327D Q-grid A, including 15 Red Data species. Thirteen species were confirmed during the site visit.

The linear nature as well as the relatively short distance of the proposed conveyor section is expected to result in limited habitat loss, when compared to the extent of habitat loss that resulted from the construction of the nearby Medupi Power Station and the Grootegeluk coal mine operations. The most significant impact of the conveyor is therefore regarded to be the physical barrier that will be created, affecting a variety of animal species likely to be found in the study area and surrounding regions. The movement of medium-sized and larger land-bound animals can potentially be restricted significantly if they have no way to cross this servitude that will be fenced off. An important aspect is with regards to the available water source located approximately 500m to the west. Accessibility will be affected for animals migrating from the east.

1.4 Ecology & Impact Evaluation

Results of the biophysical, floristic and faunal sensitivity analysis are combined to present an overview of the ecological sensitivity of the study area, indicating the high ecological sensitivity of the *Flaveria bidentis* alluvial plain and *Acacia erioloba* closed woodland areas. Habitat types similar to these are not known to occur regularly in the general region and impacts affecting the status and nature of these areas are therefore regarded significant on a local scale.

The largest extent of the study area exhibit low and medium-low ecological attributes; the proposed activity is not expected to result in significant impacts in these parts. The likelihood that sensitive biological attributes might be present in these areas is considered extremely low and the likely impacts resulting from the proposed development on biological attributes within these areas are considered insignificant.

No impacts were identified that could lead to a beneficial effect on the ecological environment of the study area since the proposed development is largely destructive. The following impacts were identified:

- **Direct impacts:**
  o Destruction of threatened flora species;
  o Destruction of protected tree species;
  o Direct impacts on threatened fauna species;
  o Direct impacts on common fauna species; and
  o Destruction of sensitive/ pristine regional habitat types;
- **Indirect Impacts:**
  o Floristic species changes within the servitudes;
  o Faunal interactions with structures, servitudes and personnel; and
  o Impacts on surrounding habitat/ species;
- **Cumulative Impacts:**
  o Increase in local and regional fragmentation/ isolation of habitat; and
  o Increase in environmental degradation.

Significance of impacts associated with the proposed development within sensitive areas is regarded as high as a result of the destructive nature of the development. Although the extent of the impact is relatively localised and small in extent, and relatively insignificant when compared to other nearby developments, the cumulative effect of habitat loss is regarded as significant. Impacts on protected tree species are regarded significant, particularly since an exceptionally high density is present within one of the ecological habitat types that will be crossed by the proposed servitude. While these species are distributed throughout the region, the high density of individuals within a small area is regarded an important attribute. While this impact can be mitigated to some extent, the overall impact is still regarded moderately significant. Particular mention is made of the presence of an existing exploration road within the high sensitivity areas. The use of this exploration road is strongly recommended for the proposed conveyor as it represents an existing impact and would imply a slight realignment of the proposed conveyor.

Direct and indirect impacts on fauna species within the remainder of the natural environment is regarded highly significant. While it is possible to mitigate these impacts to some extent, the level of impact will still remain significant, also contributing to increasing levels of habitat loss, fragmentation and isolation.

Moderately significant impacts can effective be minimised by the implementation of generic and site specific mitigation measures. One of the important aspects in this regard is the

implementation of a monitoring and maintenance programme that will prevent the spread of impacts into adjacent areas of natural habitat.

Mitigation measures are recommended in order to ameliorate expected impacts. Particular reference is made of the following mitigation measures:

- Realign the conveyor to make optimal use of existing line of degradation (existing exploration road) within sensitive environment as far as possible;
- Locate and mark all Protected tree species within the final alignment;
- Obtain necessary and required approval for damage/ removal/ cutting/ pruning of Protected tree species from Department of Forestry, as per National Forests Act (Act No. 84 of 1998) under Government Notice GN 1012 of 2004 and GN 767 of 2005
- Provide wildlife crossing zones for all fauna likely to occur in the area. Free movement across the conveyor from east to west and vice versa should be facilitated, particularly for small and medium sized animals;
- Consider the level of land in the *Flaveria bidentis* alluvial plain in order to allow adequate movement of water during intermittent periods of water flow. The level of the conveyor should be raised in order to allow for the construction of ducts underneath; and
- Maintenance roads within the *Flaveria bidentis* alluvial plain should consider intermittently wet periods and should be constructed in such a way as not to impact on the soil substrate or the water flow.

2   TERMS OF REFERENCE

The Terms of Reference for the biophysical assessment are as follows:
- Obtain all relevant biophysical data on a local and regional scale;
- Assess the importance and relevance of biophysical attributes in terms of the local ecology;
- Present an overview of relevant biophysical attributes and estimated sensitivity in terms of biodiversity;
- Compile a biophysical sensitivity analysis of the area;
- Incorporate results into the Biodiversity Impact Evaluation; and
- Map all relevant aspects.

The Terms of Reference for the floristic assessment are as follows:
- Obtain all relevant PRECIS and Red Listed flora information;
- Conduct a photo analysis of the proposed area;
- Identify preliminary floristic variations;
- Survey the area for plant community variations;
- Survey the area for floristic diversity (common flora species, Red List flora species, alien and invasive plant species and plant with medicinal properties);
- Assess the potential presence of Red List flora species;
- Assess the habitat suitability for Red List flora species;
- Assess the presence of Protected tree species;
- Describe the variation in floristic communities in terms of physical attributes;
- Describe the status and importance of regional vegetation types;
- Compile a floristic sensitivity analysis;
- Incorporate results into the Biodiversity Impact Evaluation;
- Map all relevant aspects; and
- Present all results in a suitable format.

The Terms of Reference for the faunal assessment are as follows:
- Obtain all relevant PRECIS and Red Listed faunal information
- Survey the site for faunal diversity by means of relevant survey methods;
- Assess the potential presence of Red Listed fauna species;
- Assess habitat suitability for Red Listed fauna species;
- Describe the status of available habitat;
- Compile a faunal sensitivity analysis;
- Incorporate results into the Biodiversity Impact Evaluation;
- Map all relevant aspects; and
- Present all results in a suitable format.

3   INTRODUCTION

The increase in human demand for space and life-supporting resources is resulting in a rapid loss of open space and natural habitat in South Africa. When natural systems are rezoned for development, indigenous fauna and flora are replaced by exotic species and natural habitat is converted to sterile landscapes with no dynamic propensity or ecological value. Additionally, development rarely focus on decisive planning and cumulative impacts on the biological components in order to conserve natural environments, while little thought is given to the consequences on the ecological processes of development in highly sensitive areas.

Transformation and fragmentation of natural habitat are not the only results of unplanned and intended developments, the loss of ecosystem functioning and ultimately the local extinction of species can also result. Therefore, careful planning will not only preserve rare and endemic fauna and flora, but also the ecological integrity of ecosystems of the landscape level which is imperative for the continuation of natural resources, such as fossil fuels, water and soils with agricultural potential.

In 1992, the Convention of Biological Diversity, a landmark convention, was signed by more than 90 % of all members of the United Nations. The enactment of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004), together with the abovementioned treaty, focuses on the preservation of all biological diversity in its totality, including genetic variability, natural populations, communities, ecosystems up to the scale of landscapes. Hence, the local and global focus changed to the sustainable utilisation of biological diversity.

4   LIMITATIONS OF THIS INVESTIGATION

- This report is based on a strategic investigation and selective sampling of some parts of the study area.
- No detailed or long-term investigation of biological attributes and biological diversity that may be present in the study area was conducted.
- This company, the consultants and/or specialist investigators do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from these strategic assessments or requests made to them for the purpose of this report.
- No definite conclusions may be drawn with regards to biological diversity or conservation strategies as far as this report or the study area is concerned.
- Additional information may come to light during a later stage of the process for which no allowance could have been made at the time of this report.
- BEC withholds the right to amend this report, recommendations and/ or conclusions at any stage of the project should significant or additional information come to light.
- Information contained in this report cannot be applied to any other area, however similar in appearance or any other aspect, without proper investigation.

5   PROJECT BACKGROUND

In order to adequately provide for the growing electricity demand within South Africa, Eskom Holdings Limited is in the process of constructing the Medupi Power Station in the Lephalale area, Limpopo Province. Coal to fuel the Medupi Power Station will be provided to Eskom from the Grootegeluk Coal Mine, located approximately 21 km west of Lephalale. An Environmental Impact Assessment (EIA) was undertaken for the power station and associated infrastructure, part of which included a coal conveyor and associated infrastructure, consisting of the following:

- A coal silo at the mine;
- A coal feed conveyor belt between the mine and the power station. This conveyor will cross the Farm Turfvlakte for which Exxaro hold the prospecting and mining rights; and
- An access road to be utilised during construction and operation of the coal silo and conveyor.

Two alternatives were considered in the EIA assessment undertaken for the Medupi Power Station and associated infrastructure, namely:

- *An eastern alignment:* which runs from the Exxaro Grootegeluk coal mine in a south-easterly direction along the existing railway line, turning southwards towards the farm Naauwontkomen 509 LQ. This alignment is approximately 7.5 km in length.
- *A western alignment:* which follows a shorter, straighter alignment cutting through the farms Enkelbult and Turfvlakte (both owned by Exxaro who has prospecting and mining rights on these properties) in a southerly direction towards the farm Naauwontkomen 509 LQ. This alignment is approximately 4.5 km in length.

The eastern alignment was recommended as the preferred alignment primarily due to the fact that it follows the existing linear infrastructure in the area (i.e. the railway line), and therefore allowed for the consolidation of new and existing infrastructure of a similar nature. The Record of Decision (RoD) for the construction and operation of the Medupi Power included, *inter alia*, the eastern alignment and required infrastructure for the coal conveyor.

Subsequent to the submission of the EIA Report and authorisation of the Medupi Power Station, Exxaro however indicated to Eskom that Eskom would be permitted to construct and operate a coal conveyor along the proposed western alignment over potentially 'mineable area' on the Farm Turfvlakte. As the western alignment option would be preferred from a technical and economic perspective, an application for amendment to the RoD was submitted. This amendment was granted by DEA.

In terms of the Minerals and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002) and National Environmental Management Act (NEMA; Act No. 107 of 1998), Exxaro is required to undertake an Environmental Impact Assessment (EIA) process to amend the mine's current approved Environmental Management Programme (EMP) to include the coal silo, coal conveyor and access road.

The No-Go alternative for this particular project implies that if the coal silo, coal conveyor and associated access road are not constructed, an alternative means of delivering the coal to the power station will need to be investigated by Eskom Holdings Limited and Exxaro Resource (Pty) Ltd. This could result in significant cost implications and/or a delay in the commissioning of the Medupi Power Station which is of National strategic importance to South Africa. This alternative is therefore not considered to be a feasible alternative.

6 APPROACH TO THE STUDY

While a proper knowledge of the biodiversity of the region is not negotiable to the ultimate success of this project, an attempt was made to remove subjective opinions that might be held on any part of the study area as far as possible. Inherent characteristics of a project of this nature implies that no method will be foolproof, mainly as a result of shortcomings in available databases and lack of site specific detail that could be obtained from detailed site investigations conducted over a short period of time. It is an unfortunate fact that inherent sensitivities within certain areas are likely to exist that could not be captured or illustrated during the process. This is unfortunately a shortcoming of every scientific study that has ever been conducted; it simply is not possible to know everything or to consider aspects to a level of molecular detail. However, the approach followed in this study is considered effective in presenting objective comments on the biodiversity of the study area and how these relate to local and regional sensitivities.

In order to present an objective opinion of the biodiversity sensitivity of the proposed line and how this relates to the suitability/ unsuitability of the proposed development, all opinions and statements presented in this document are based on specialists' interpretation of available data, or known sensitivities of certain aspects and the augmentation of existing knowledge by means of field surveys and site specific information.

The Precautionary Principal is applied throughout the assessment[1].

6.1 Biophysical Sensitivity Assessment

Available biophysical data are implemented to identify areas of regional importance as it relates to biodiversity. Biophysical attributes known to be associated with biodiversity aspects of importance, conservation potential or natural status of the environment are implemented to compile the ecological sensitivity analysis of the study area. These attributes include the following (irrelevant data is omitted from the assessment):
• Areas of known floristic or faunal importance;
• Areas of surface water;
• Degradation classes (ENPAT Land Cover Classes);
• Regional vegetation types (VEGMAP); and
• Land cover categories.

[1] (www.pprinciple.net/the_precautionary_principle.html).

The first step in assessing the biophysical aspects of importance is the delineation of natural habitat, or the exclusion of transformed or degraded habitat. Areas that are transformed as a result of human activities, including agriculture, mining, urban development, etc, constitute parts of the study area where no natural habitat remains and where natural biodiversity is entirely compromised, to the extent that any recovery to a previous, pristine status is regarded impossible. These areas are generally suitable for the purpose of construction and development since impacts on important biological resources are regarded benign or highly unlikely. Ultimately, areas that are characterised by high levels of transformation or degradation (low occurrences of biophysical or biodiversity importance) are considered suitable for development, in contrast to areas constituting large tracts of untransformed and sensitive habitat types.

Secondly, sensitivity values are ascribed to biophysical attributes based on how these contribute to biological diversity or sensitivity. The highest sensitivity value for respective biophysical attributes is regarded representative of the biophysical sensitivity of any particular area. Ultimately all the information is compiled to present a holistic picture of the areas where biophysical aspects of importance occur, presenting a map that depicts regional biodiversity sensitivities based on biophysical attributes.

6.2   Floristic Assessment

6.2.1   General Floristic Attributes

The vegetation investigation is based on a variation of the Braun-Blanquet method whereby vegetation is stratified on aerial images with physiognomic[2] characteristics as a first approximation. These initial stratifications are then surveyed for floristic and environmental diversity during a site investigation and ultimately subjected to a desktop analysis to establish differences/ similarities between observed units.

In preparation for the site survey, physiognomic homogenous units are identified and delineated on digital aerial photos, using standard aerial photo techniques. A site visit was conducted in March 2010 to examine the general floristic attributes and -diversity of the study area. Qualitative observations were made at every sample plot and the following data were recorded:
- plant species and life forms;
- physiognomic characteristics of the vegetation;
- ecological quality of the area (with reference of to degree of disturbance and proportion of weeds and invasive species;
- the physical landscape (soil, topography, rockiness, slope, aspect, etc.); and
- digital photographs of all pertinent attributes.

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[2] Physiognomy refers to the visual appearance of vegetation in terms of different growth classes, biomass, height, etc.

A desktop analysis of sample data was conducted to establish differences/ similarities between delineated vegetation units, which were subsequently described in terms of species composition and dominance as well as driving (developmental) environmental parameters. Preliminary results and species lists that are provided should be interpreted with normal liabilities in mind.

6.2.2   Red Listed Flora

Red Listed flora information, as presented by SANBI was used as a point of departure for the Red Listed assessment. Since a snapshot investigation of an area, such as this particular investigation, represents a severe limitation in terms of locating and identification potential Red Listed flora species, particular emphasis was placed on the identification of habitat deemed suitable for the possible presence of Red Listed plant species and associating the suitability of the habitat to known habitat types of Red Listed flora species.

6.2.3   Floristic Sensitivity

The aim of this exercise is to determine the inherent sensitivity of vegetation communities by means of the comparison of weighted floristic attributes. Results of this exercise are not 'stand-alone' and will eventually be presented in conjunction with results obtained from the faunal investigation.

The first step in the process is the identification of **Sensitivity Criteria**. These criteria represent floristic attributes of the area that contribute towards the inherent sensitivity/ degradation of the different vegetation types. A **Weighting** is applied to each of the Sensitivity Criterion and this is determined by means of ranking of each criterion against all other Sensitivity Criteria, placing the criteria on a scale of increasing importance from 1 to 10, where 10 represents the highest importance category and 1 the lowest.

Each vegetation unit is subjectively rated on a scale of 1 to 10 (**Sensitivity Values**) in terms of the influence that the particular Sensitivity Criterion has on the floristic status of the plant community. Separate Values are multiplied with the respective Criteria Weighting, which emphasises the importance/ triviality that the individual Sensitivity Criteria have on the status of each community.

Ranked Values are then added and expressed as a percentage of the maximum possible value (**Floristic Sensitivity Value**) and placed in a particular class, namely:

High	80%	–	100%
Medium – high	60%	–	80%
Medium	40%	–	60%
Medium – low	20%	–	40%
Low	0%	–	20%

This method is considered effective in highlighting sensitive areas, based on observed floristic attributes rated across the spectrum of communities. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics, e.g. human impacts, size, fragmentation are important in assessing the status of the various communities.

High Sensitivity Index Values indicate areas that are considered sensitive, pristine, unaffected by human influences or generally managed in an ecological effective manner. These areas can be compared to nature reserves and even well managed farm areas where a high diversity of plants is present, particularly Red Data/ Protected species. Low Sensitivity Index Values indicate areas of lower ecological status or importance in terms of vegetation attributes, or areas that have been negatively affected by human impacts or poor management.

Sensitivity Criteria employed in assessing the floristic sensitivity of separate units may vary between different areas, depending on location, type of habitat, size, etc. As part of this analysis the following factors were assumed as important in determining the sensitivity of vegetation units of this particular site:

- Habitat suitability for the potential presence of Red Listed species;
- Landscape or habitat significance;
- Floristic status;
- Plant species diversity; and
- Ecological performance/fragmentation.

6.3 Faunal Assessment

6.3.1 Faunal Diversity

A general survey of the area is conducted during which all observations are made to the presence of faunal groups, including mammals, birds, herpetofauna and invertebrates. In addition to visual observations, signs of the presence of animals, including faeces, tracts and sounds are used to identify fauna species present within the area. Limited time available for the surveys prevented any trapping, audio captures or still photography for prolonged periods.

Habitat characteristics are assessed in order to provide guidance in terms of faunal assemblages, composition and status.

6.3.2   Red Listed fauna Probabilities

As a result of restrictions with regards to database availability only specific faunal groups are used during the species-specific element of this faunal assessment. Data on the Q-degree level is available for the following faunal groups:

- Invertebrates: Butterflies (South African Butterfly Conservation Assessment – http://sabca.adu.org.za)
- Amphibians: Frogs (Atlas and Red Data Book of the South Africa, Lesotho and Swaziland)
- Reptiles: Snakes and other Reptiles (South African Reptile Conservation Assessment - http://sarca.adu.org.za)
- Avifauna: Birds (South African Bird Atlas Project 2 – http://sabap2.adu.org.za)
- Mammals: Terrestrial Mammals (Red Data Book of the Mammals of South Africa: A Conservation Assessment.)

Animals found to be present in the Q-grid 2327DA in the above-mentioned databases were considered potential inhabitants of the study area. Additionally, species observed in the study sites during the field investigation were added to the list of species considered relevant to the study area. The likelihood of each species' presence in the study areas were estimated based on known ecological requirements of species, which were compared to the ecological conditions found in the study area and surrounding faunal habitat. Three parameters are used to assess the Probability of Occurrence of Red Listed species:

- Habitat requirements (HR) - Red Listed animals have specific habitat requirements and the presence of these habitat characteristics in the study area is evaluated.
- Habitat status (HS) - The status or ecological condition of available habitat in the study area is assessed. Often, a high level of degradation of a specific habitat type will negate the potential presence of Red Listed species (especially wetland-related habitats where water quality plays a major role); and
- Habitat linkage (HL) - Movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to surrounding habitats and adequacy of these linkages are evaluated for the ecological functioning of Red Listed species within the study area.

The estimated Probability of Occurrence is presented in five categories, namely:

- very low;
- low;
- moderate;
- high; and
- very high.

6.3.3   Faunal Habitat Sensitivities

Faunal habitat sensitivities are subjectively estimated based on the following criteria:
- Habitat status;
- Connectivity;
- Observed species composition; and
- Functionality.

and is place in one of the following classes:
- High;
- Medium-high
- Medium;
- Medium-low; or
- Low.

6.4   Impact Evaluation

Direct, indirect and cumulative impacts of issues will be assessed in terms of the following criteria.

6.4.1   Nature of the Impact

A description of what causes the effect, what will be affected and how it will be affected.

6.4.2   Spatial Extent of the Impact

Quantifying the spatial effect of impacts; whether the impact will be local (limited to the immediate area) or regional (having a far-ranging effect).

1   Limited to the site and its immediate surroundings;
2   Local/ Municipal extending only as far as the local community or urban area;
3   Provincial/Regional;
4   National i.e. South Africa; or
5   Across International borders.

6.4.3   Duration of the Impact

Determines the expected duration of the impact in terms of years.

1   Immediate (less than 1 year);
2   Short term (1-5 years);
3   Medium term (5-15 years);
4   Long term (the impact will cease after the operational life span of the project); or

5   Permanent (no mitigation measures of natural process will reduce the impact after construction).

6.4.4   Magnitude of the Impact

Quantified between the scales of small (will have not effect on the environment) and very high (will result in complete destruction of patterns and permanent cessation of processes).

0   None (where the aspect will have no impact on the environment);
1   Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected);
2   Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected);
3   Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way);
4   High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
5   Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).

6.4.5   Reversibility of the Impact

1   Reversible (regenerates naturally);
3   Recoverable (requires human input); or
5   Irreversible

6.4.6   Consequence of the Impact

Derived from the following formula:
Consequence = Severity + Reversibility + Duration + Spatial Scale

6.4.7   Probability of Occurrence

Describes the likelihood of the impact actually occurring.

0   None (impact will not occur);
1   Improbable (the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures);
2   Low probability (there is a possibility that the impact will occur);
3   Medium probability (the impact may occur);
4   High probability (it is most likely that the impact will occur); or
5   Definite / do not know (the impact will occur regardless of the implementation of any prevention or corrective actions or it the specialist does not know what the probability will be based on too little published information).

6.4.8   Significance of the Impact

Based on a synthesis of the information contained in the points above and can be described as low, medium or high. Significance is determined using the following formula:
Significance of environmental impact = Consequence X Probability

- More than 60 significance points indicate HIGH environmental significance;
- Between 30 and 60 significance points indicate MODERATE environmental significance; and
- Less than 30 points indicate LOW environmental significance.

Relevant mitigation measures will be considered and impacts will then be ranked again according to the significance results after mitigation.

6.4.9   Status of the Impact

- Negative effect (i.e. at a cost to the environment);
- Positive effect (i.e. at a benefit to the environment); or
- Neutral effect on the environment.

6.4.10   Mitigation of the Impact

The degree to which the impact can be mitigated.

7   THE BIOPHYSICAL ENVIRONMENT

7.1   Location

The study area is located approximately 21km west of the town Lephalale on the farm Turfvlakte 463 LQ (Figure 1). The proposed conveyor will supply coal to the Medupi Power Station, which is located on the farm Naauwontkomen 509 LQ and approximately 4km to the south of Grootegeluk Mine and. This proposed conveyor alignment follows a straight line through the farms Enkelbult and Turfvlakte in a southerly direction towards the farm Naauwontkomen 509 LQ. This alignment is approximately 4.5km in length. Eskom will furthermore provide a 10,000t silo at the Grootegeluk Mine premises.

A composite Google Earth image of the study area is presented in Figure 2.

7.2   Surface Water

The central part of the proposed servitude crosses an alluvial plain which will be affected by the proposed development. This type of plain is formed over a long period of time by a river depositing sediment on its floodplain or bed which becomes alluvial soil. The difference between a floodplain and an alluvial plain is that the floodplain represents the area experiencing flooding fairly regularly in the present or recently, whereas an alluvial plain includes areas where the floodplain is now and used to be, or areas which only experience flooding a few times a century. The status of this area is regarded relative degraded and it would appear as if flow periods are extremely sporadic. Soil types in this area include the Ae252 land type unit (Land Type Survey Staff, 1987) (ENPAT, 2001). A-units refer to yellow and red soils without water tables and belonging in one or more of the following soil forms: Inanda, Kranskop, Magwa, Hutton, Griffin or Clovelly. Ae land types (red, high base status, >300mm deep, no dunes), yellow soils occupy less than 10% of the area while dystrophic and/ or mesotrophic soils occupy a larger area than high base status red-yellow apedal soils. Slopes within the Ae252 land type varies from 0 to 2%. Only footslopes and valley bottoms are represented in this land type unit. The Oaklands soil formation is prevalent in the bottomlands (Hutton to a lower degree) and the clay content of the A-horizon varies between 6 and 12%. Soil depth in this land type is generally less than 1,200 mm.

An informal constructed drainage channel is present in the central northern section of the proposed servitude. Standing water infrequently collects in the transformed mining areas in the northern section of the proposed servitude. A natural pan is situated approximately 500m to the west of the line in the southern section (Figure 2). It is unlikely that this area will be affected directly by the proposed development. Movement patterns of fauna species utilising this area is however likely to be affected.
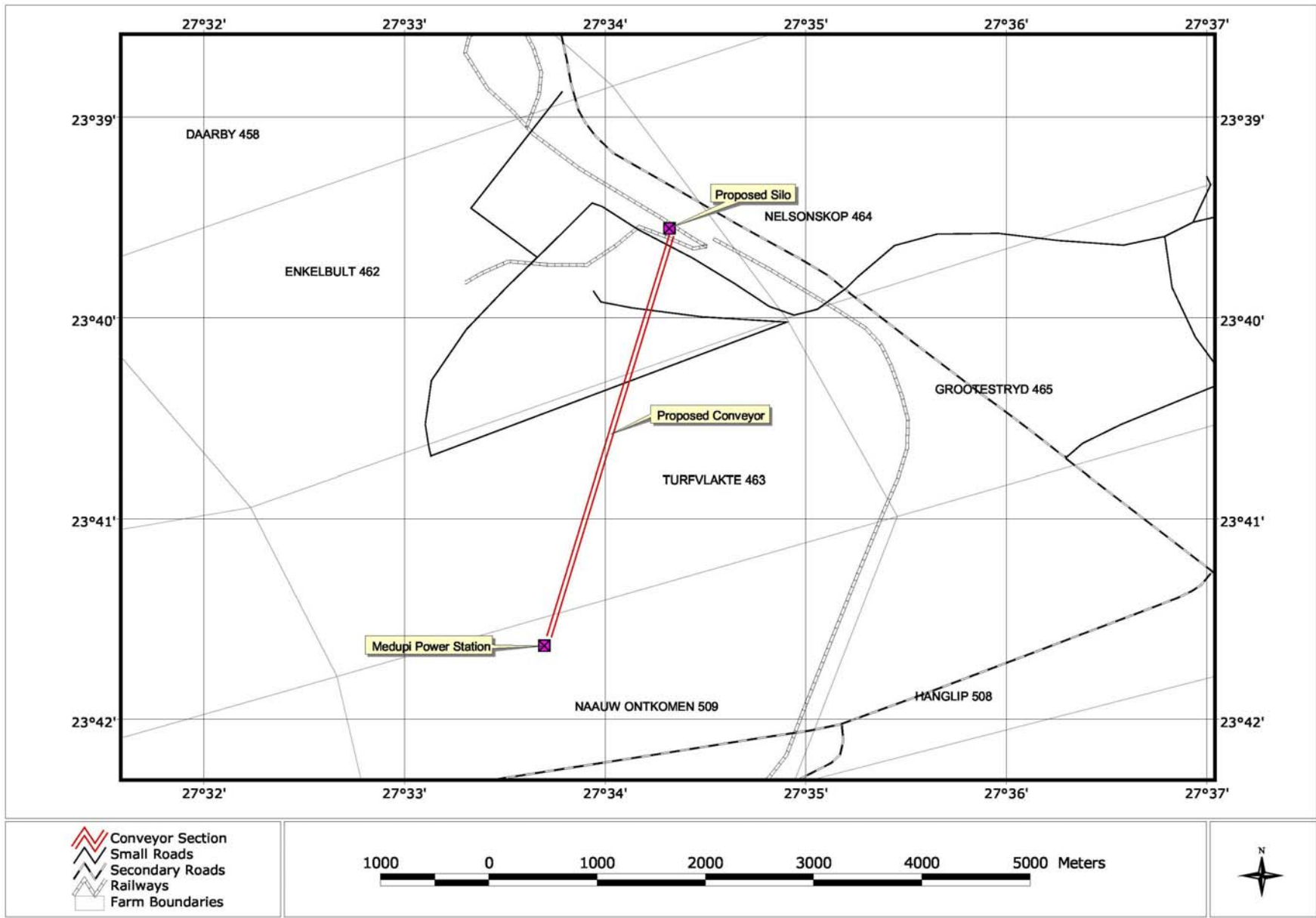
Figure 1: Regional setting of the study area
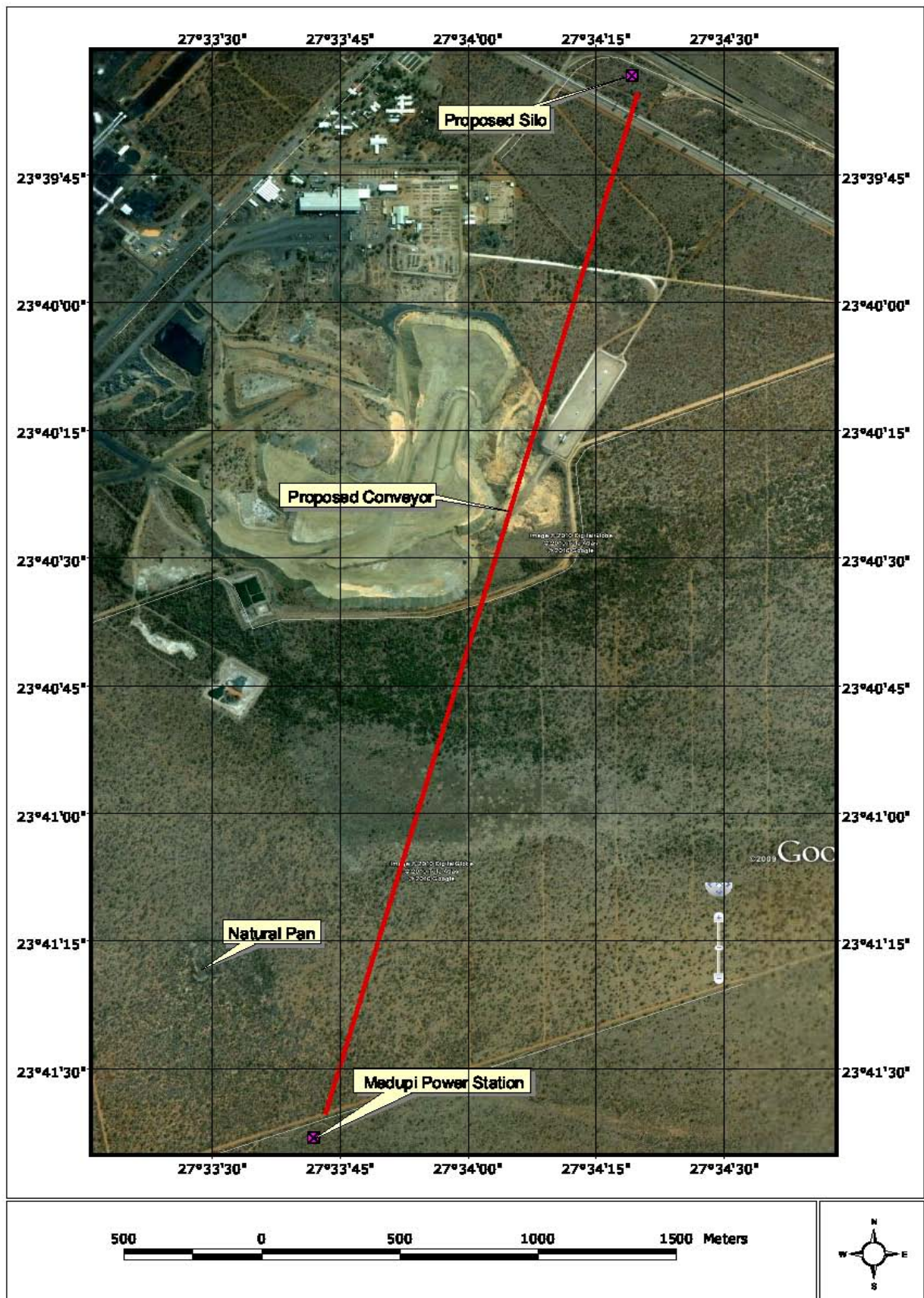
Figure 2: Google Earth image of the study area

Floristic Habitat Types
- Acacia – Eragrostis stipitata Sandveld
- Closed Acacia erioloba Woodland
- Flaveria bidentis Alluvial Plain
- Mixed Acacia Veld
- Transformed Habitat

500   0   500   1000 Meters
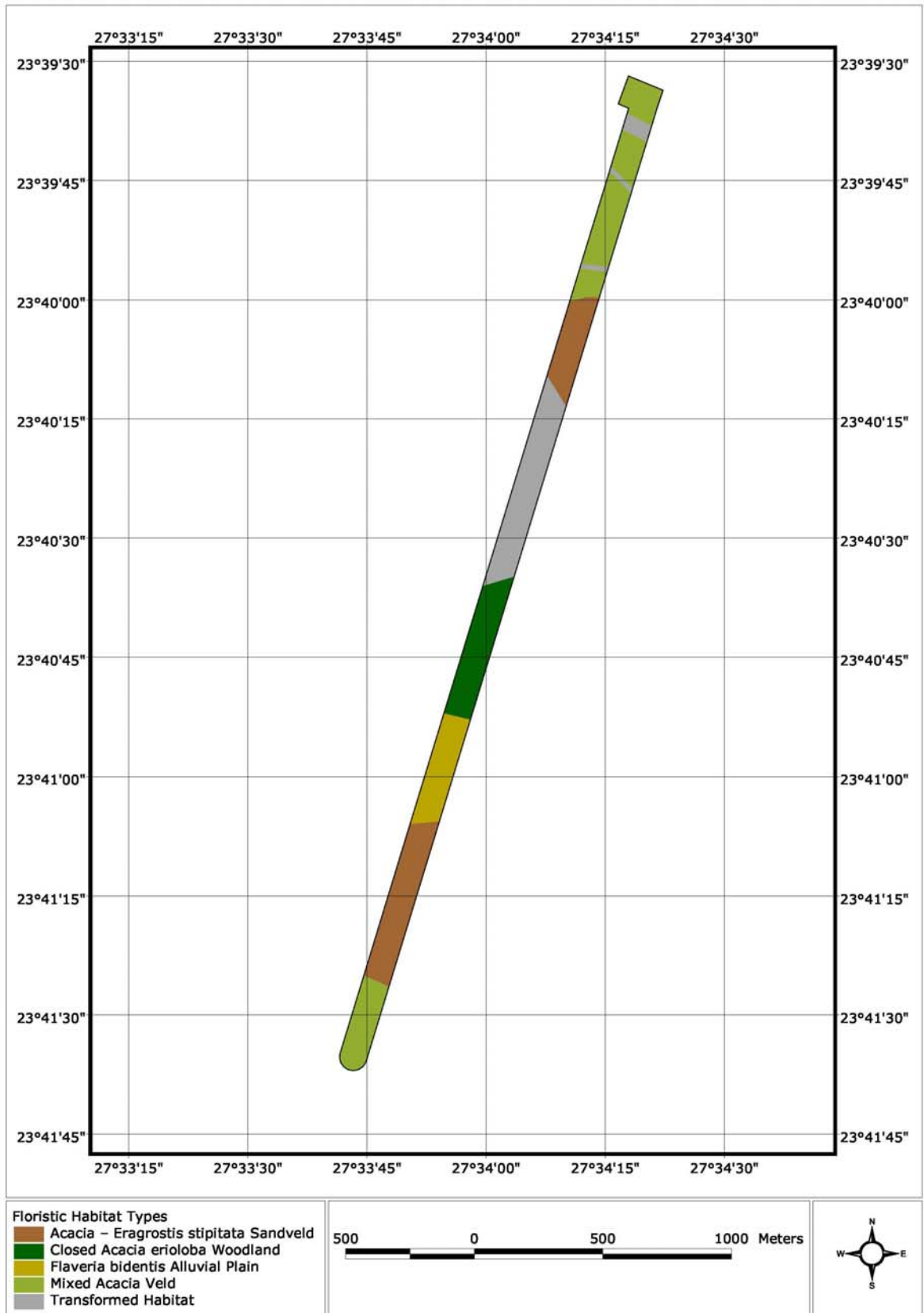
Figure 3: Land Cover & Land Use

For the purpose of this biodiversity assessment, land cover are loosely categorised into classes that represent natural habitat and land use categories that contribute to habitat degradation and transformation on a local or regional scale. In terms of the importance for biodiversity the assumption is made that landscapes that exhibit high levels of transformation are normally occupied by plant communities and faunal assemblages that does not reflect the original or pristine status of an area or region. This is particularly important in the case of Red Data species as these plants and animals have extremely low levels of disturbance tolerances, which is one of the main reasons for being threatened. Any significant changes to the status of habitat available to these species are likely to result in similarly significant impacts on these species and their conservation status.

Three important aspects are associated with habitat changes that accompany certain land uses. Permanent transformation of natural habitat by land uses such as agriculture, mining and urbanisation results in the permanent decimation of available habitat for flora and fauna species as these areas will not return to the original pristine status. A second aspect of habitat transformation or degradation is that it affects species directly, namely a change in species composition of an area results from an exodus of some species that are no longer able to exist in changed habitat conditions, the decrease in abundance of certain species as a result of decreased habitat or an influx of species that are not normally associated with the original or pristine habitat, but is suitably adapted to the changed environment. While some, or most, of the species that occupy these changed habitat conditions might be indigenous to a region, they are not endemic to an area. Lastly a larger threat to the natural biodiversity of a region is represented by the influx of invasive exotic species and weeds that can effectively sterilise large tracts of remaining natural habitat.

Two main categories are represented in the area, namely mining areas and natural woodland. The major form of land transformation in the region is the result of mining (opencast coal mining), with limited agriculture and urban areas. Natural woodland areas are presently in a relative undisturbed status.

7.3   Ridges & Topography

The ENPAT database indicates that the study area does not comprise any area where significant slopes are present; land type information furthermore indicates that slopes in the region generally vary between 0 and 3%. This was also confirmed during the site investigation. The general topography is described as 'Plains', defined an area formed from the deposition of alluvium usually adjacent to a river that periodically overflows. It is also described as any relatively level area that exhibits gentle slopes and small local relief (differences in elevation).

7.4   Regional Vegetation - VEGMAP

The study area is situated within the Limpopo Sweet Bushveld vegetation type. This vegetation type extends from the lower reaches of the Crocodile and Marico Rivers down the Limpopo River valley. It is short, open woodland dominated by *Acacia mellifera* and *Dichrostachys cinerea* as well as taller tree species such as *A. robusta*, *A. burkei* and *Terminalia sericea*. The high palatability of the graminoid composition makes this vegetation type highly suitable for game farming practices.

This vegetation type is not threatened (Least Threatened) and although only 1% is formally conserved, much is contained within private nature reserves and game farms. Approximately 5% is transformed by cultivation. Though limited by low rainfall, this is a good area for game and cattle farming due to the high grazing capacity of sweet veld. The Central Bushveld endemic herb *Piaranthus atrosanguinalis* occurs in this vegetation type. Important taxa include the following.

- **Tall Trees**

Acacia robusta and *A. burkei.*

- **Small Trees**

Acacia erubescens, A. fleckii, A. nilotica, A. senegal var*. rostrata, Albizia anthelmintica, Boscia albitrunca, Combretum apiculatum* and *Terminalia sericea.*

- **Tall Shrubs**

Catophractes alexandri, Dichrostachys cinerea, Phaeoptilum spinosum, Rhigozum obovatum, Cadaba aphylla, Combretum hereroense, Commiphora pyracanthoides, Ehretia rigida subsp*. rigida, Euclea undulata, Grewia flava* and *Gymnosporia senegalensis.*

- **Low Shrubs**

Acacia tenuispina, Commiphora africana, Felicia muricata, Gossypium herbaceum subsp*. africanum* and *Leucosphaera bainesii.*

- **Graminoids**

Digitaria eriantha subsp*. eriantha, Enneapogon cenchroides, Eragrostis lehmanniana, Panicum coloratum, Schmidtia pappophoroides, Aristida congesta, Cymbopogon nardus, Eragrostis pallens, E. rigidior, E. trichophora, Ischaemum afrum, Panicum maximum, Setaria verticillata, Stipagrostis uniplumis* and *Urochloa mosambicensis.*

- **Herbs**

Acanthosicyos naudinianus, Commelina benghalensis, Harpagophytum procumbens subsp*. transvaalense, Hemizygia elliottii, Hermbstaedtia odorata* and *Indigofera daleoides.*

- **Succulent Herbs**

Kleinia fulgens and *Plectranthus neochilus.*

8   FLORISTIC ATTRIBUTES OF THE STUDY AREA

8.1   Floristic Diversity

The SANBI database indicates the presence of 317 plant species within the 2327DA ¼ degree grid in which the study area is located. This diversity is not regarded particularly high and is regarded a reflection of undersampling of the flora in the region, rather than an actual low species diversity. The Savanna Biome is known to support more than 5,700 plant species, exceed only by the Fynbos Ecoregion in species richness.

The species list that was compiled during the site investigation is considered moderately comprehensive taking the relative late season and small area into consideration. Some plant species are only visible during specific periods of the year and is identifiable only from reproductive material that is present during specific seasons (phenological variation).

A total of 72 plant species were identified during the site investigations (Table 1). The physiognomy is typical of a woodland area that is dominated by the shrub and tree stratum. A relative high diversity of shrubs (16 species, 22.2%) and trees (14 species, 19.4%) is present, also dominating the physiognomy of the area. A fairly high diversity of forbs (19 species, 26.4%) and grasses (19 species, 26.4%) is also present. The diversity of plant species within the study area is represented by 28 plant families (Table 3), dominated by Poaceae (grasses, 19 species, 26.4%), Mimosaceae (Acacias, 12 species, 16.7%) and Combretaceae (5 species, 6.9%).

Table 1: Species list for the study area			
Taxon	**Growth Form**	**Family**	**Status/ Medicinal Properties & Uses**
Abutilon austro-africanum	Forb	Malvaceae	
Acacia burkei	Tree	Mimosaceae	
Acacia erioloba	**Tree**	**Mimosaceae**	**Protected (National Forest Act, 1998), fire wood**
Acacia erubescens	Tree	Mimosaceae	Edible gum
Acacia mellifera	Shrub	Mimosaceae	Invasive shrub, medicinal
Acacia nigrescens	Tree	Mimosaceae	
Acacia nilotica	Tree	Mimosaceae	Dyes and tans
Acacia robusta	Tree	Mimosaceae	
Acacia species	Tree	Mimosaceae	
Acacia tortilis	Tree	Mimosaceae	Medicinal
Acacia xanthophloea	Tree	Mimosaceae	
Alternanthera pungens	Forb	Amaranthaceae	Weed
Ammocharis coranica	Geophyte	Amaryllidaceae	
Aristida adscensionis L.	Grass	Poaceae	Increaser 2. Administered to people. Applied in magical sense
Aristida congesta subsp. *barbicollis*	Grass	Poaceae	
Aristida congesta subsp. *congesta*	Grass	Poaceae	Increaser 2. Administered to people.
Aristida stipitata	Grass	Poaceae	
Barleria affinis	Forb	Acanthaceae	

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Table 1: Species list for the study area

Taxon	Growth Form	Family	Status/ Medicinal Properties & Uses
Boscia foetida	Shrub	Capparaceae	Medicinal
Bothriochloa insculpta	Grass	Poaceae	
Cenchrus ciliaris	Grass	Poaceae	Medicinal
Combretum apiculatum	Shrub	Combretaceae	Medicinal, firewood
Combretum hereroense	Shrub	Combretaceae	Firewood
Combretum imberbe	**Tree**	**Combretaceae**	**Protected (National Forest Act, 1998), fire wood**
Combretum zeyheri	Tree	Combretaceae	
Commelina africana	Forb	Commelinaceae	Medicinal
Commiphora pyracanthoides	Shrub	Burseraceae	Household
Cucumis zeyheri	Forb	Cucurbitaceae	
Cynodon dactylon	Grass	Poaceae	Pioneer grass
Dichrostachys cinerea	Shrub	Mimosaceae	Invasive shrub, medicinal
Dicoma tomentosa	Forb	Asteraceae	
Digitaria eriantha	Grass	Poaceae	Increaser 2. Administrated to people. Harmful to people & animals. Applied in magical sense
Ehretia rigida	Shrub	Ehretiaceae	
Elephantorrhiza burkei	Shrub	Mimosaceae	Dyes and tans
Eragrostis lehmanniana	Grass	Poaceae	Thatching
Eragrostis pallens	Grass	Poaceae	Thatching & weaving
Eragrostis rigidior	Grass	Poaceae	
Eragrostis superba	Grass	Poaceae	
Euclea undulata	Shrub	Ebenaceae	Bark & root used medicinally. Browsed by game
Evolvulus alsinoides	Forb	Convolvulaceae	
Flaveria bidentis	Forb	Asteraceae	Weed
Gardenia volkensii	Tree	Rubiaceae	Fruit and roots are used medicinally
Grewia bicolor	Shrub	Tiliaceae	Edible & used in making of beer
Grewia flava	Shrub	Tiliaceae	Administrated to people and animals. Edible & used in making of beer
Grewia flavescens	Shrub	Tiliaceae	Edible & used in making of beer
Grewia occidentalis	Shrub	Tiliaceae	Administrated to people. Bark and leaves are used medicinally
Heliotropium ciliatum	Forb	Boraginaceae	
Heteropogon contortus	Grass	Poaceae	Increaser 2. Administrated to people. Harmful to people & animals.
Indigofera species	Forb	Fabaceae	
Kyphocarpa angustifolia	Forb	Amaranthaceae	
Ledebouria ovalifolia	Geophyte	Liliaceae	
Melhania acuminata	Forb	Malvaceae	Weed
Melinis nerviglumis	Grass	Poaceae	Pioneer grass
Momordica balsamina	Climber	Cucurbitaceae	
Oxygonum dregeanum	Forb	Polygonaceae	Pioneer forb
Panicum maximum	Grass	Poaceae	
Peltophorum africanum	Tree	Caesalpiniaceae	Medicinal
Phragmites mauritianus	Sedge	Poaceae	Naturalised
Phyllanthus species	Forb	Euphorbiaceae	
Pogonarthria squarrosa	Grass	Poaceae	Pioneer grass, Increaser 2. Administrated to people.
Rhigozum brevispinosum	Shrub	Bignoniaceae	

Table 1: Species list for the study area			
Taxon	Growth Form	Family	Status/ Medicinal Properties & Uses
Rhynchosia spectabilis	Forb	Fabaceae	
Schmidtia pappophoroides	Grass	Poaceae	
Solanum species	Forb	Solanaceae	Weed
Stipagrostis uniplumis	Grass	Poaceae	
Tephrosia species	Forb	Fabaceae	
Terminalia sericea	Tree	Combretaceae	Medicinal
Tylosema fassoglense	Forb	Caesalpiniaceae	Medicinal
Urochloa panicoides	Grass	Poaceae	
Vernonia sutherlandii	Forb	Asteraceae	
Ximenia caffra	Shrub	Olacaceae	Edible fruit, medicinal
Ziziphus mucronata	Shrub	Rhamnaceae	Administrated to people. Harmful to people & animals. Applied in magical sense

Table 2: Growth forms for the study area		
Growth Form	Number	Percentage
Climbers	1	1.4%
Forbs	19	26.4%
Geophytes	2	2.8%
Grasses	19	26.4%
Sedges	1	1.4%
Shrubs	16	22.2%
Trees	14	19.4%
Total	72	

8.2 Floristic Habitat types

Results of the photo analysis and site investigations revealed the presence of the following floristic habitat types (Figure 3):

- Acacia – *Eragrostis stipitata* Sandveld;
- Closed *Acacia erioloba* Woodland;
- *Flaveria bidentis* Alluvial Plain;
- Mixed Acacia Veld; and
- Transformed Habitat.

The extent of habitat types within the study area is presented in Table 3.

Table 3: Extent of habitat types within study area		
Habitat	Area (ha)	Percentage
Acacia – *Eragrostis stipitata* Sandveld	9.27ha	25.3%
Closed *Acacia erioloba* Woodland	5.00 ha	13.6%
Flaveria bidentis Alluvial Plain	3.94 ha	10.7%
Mixed Acacia Veld	10.49 ha	28.6%
Transformed Habitat	7.99 ha	21.8%
Total	36.69ha	

8.3   *Acacia* – Eragrostis stipitata *Sandveld*

This unit comprises 25.3% of the proposed servitude and is regarded representative of a variation of the regional vegetation type (Limpopo Sweet Bushveld). Typical biophysical habitat attributes include yellow soils with relative low clay content and even slopes and the vegetation reflects the sandiness of the soils with typical sand plant species such as *Aristida stipitata, Eragrostis pallens, Evolvulus alsinoides, Heliotropium ciliatum, Schmidtia pappophoroides* and *Terminalia sericea* (Silver Cluster Leaf) occurring as prominent species. The vegetation is of this unit conforms to a slightly open woodland with woody species occurring at slightly lower densities compared to the typical woodland of the region; this is mainly attributes to a relative low presence of shrubs of the 1.5m to 3m class. The height of trees varies between 4 and 6m.

Because there is only a slight difference in biophysical habitat conditions between this and the Mixed Acacia Veld, many of the prominent plant species of these units occur as co-dominants, including many of the Acacia species, *Aristida adscensionis, Dichrostachys cinerea* (Sickle bush)*, Digitaria eriantha, Eragrostis lehmanniana, Eragrostis rigidior, Grewia flava, Melhania acuminata* and *Panicum maximum.*

A total of 35 plant species were observed within this part of the study area, but the species diversity is likely to be higher than indicated in Table 4. The protected trees *Acacia erioloba* (Camel Thorn) and *Combretum imberbe* (Leadwood) is present within this variation, but at relative low densities. It should be noted that, although no individuals of the protected tree *Boscia albitrunca* (Shepard's Tree) were observed within this unit, it is likely to occur in the area and therefore also in this unit. A medium-low probability of encountering Red Data plant species within this unit is estimated.

The vegetation of this unit is relative pristine and unaffected by surrounding land transformation and degradation effects and a medium-high floristic status is ascribed to this area.

Table 4: Species list for the Acacia – *Eragrostis stipitata* Sandveld unit			
Taxon	Growth Form	Family	Status/ Medicinal Properties & Uses
Acacia burkei	Tree	Mimosaceae	
Acacia erioloba	**Tree**	**Mimosaceae**	**Protected (National Forest Act, 1998), fire wood**
Acacia nigrescens	Tree	Mimosaceae	
Aristida congesta subsp*. congesta*	Grass	Poaceae	Increaser 2. Administrated to people.
Aristida stipitata	Grass	Poaceae	
Boscia foetida	Shrub	Capparaceae	Medicinal
Combretum apiculatum	Shrub	Combretaceae	Medicinal, firewood
Combretum hereroense	Shrub	Combretaceae	Firewood
Combretum imberbe	**Tree**	**Combretaceae**	**Protected (National Forest Act, 1998), fire wood**
Combretum zeyheri	Tree	Combretaceae	

Table 4: Species list for the Acacia – *Eragrostis stipitata* Sandveld unit			
Taxon	**Growth Form**	**Family**	**Status/ Medicinal Properties & Uses**
Cucumis zeyheri	Forb	Cucurbitaceae	
Dichrostachys cinerea	Shrub	Mimosaceae	Invasive shrub, medicinal
Digitaria eriantha	Grass	Poaceae	Increaser 2. Administrated to people. Harmful to people & animals. Applied in magical sense
Elephantorrhiza burkei	Shrub	Mimosaceae	Dyes and tans
Eragrostis lehmanniana	Grass	Poaceae	Thatching
Eragrostis pallens	Grass	Poaceae	Thatching & weaving
Eragrostis rigidior	Grass	Poaceae	
Evolvulus alsinoides	Forb	Convolvulaceae	
Gardenia volkensii	Tree	Rubiaceae	Fruit and roots are used medicinally
Grewia flava	Shrub	Tiliaceae	Administrated to people and animals. Edible & used in making of beer
Grewia occidentalis	Shrub	Tiliaceae	Administrated to people. Bark and leaves are used medicinally
Heliotropium ciliatum	Forb	Boraginaceae	
Indigofera species	Forb	Fabaceae	
Melhania acuminata	Forb	Malvaceae	Weed
Melinis nerviglumis	Grass	Poaceae	Pioneer grass
Oxygonum dregeanum	Forb	Polygonaceae	Pioneer forb
Pogonarthria squarrosa	Grass	Poaceae	Pioneer grass, Increaser 2. Administrated to people.
Rhigozum brevispinosum	Shrub	Bignoniaceae	
Schmidtia pappophoroides	Grass	Poaceae	
Solanum species	Forb	Solanaceae	Weed
Stipagrostis uniplumis	Grass	Poaceae	
Tephrosia species	Forb	Fabaceae	
Terminalia sericea	Tree	Combretaceae	Medicinal
Urochloa panicoides	Grass	Poaceae	
Ximenia caffra	Shrub	Olacaceae	Edible fruit, medicinal

8.4   *Closed* Acacia erioloba *Woodland*

This unit comprises 13.6% of the proposed servitude and is regarded to be a pristine variation of the regional vegetation type (Limpopo Sweet Bushveld). Biophysical habitat conditions include even slopes, dark soils with a moderate to low clay content of the A-horizon, but slightly higher than the Acacia – *Eragrostis stipitata* Sandveld unit, hence the prominence of numerous of Acacia species, including *Acacia burkei* (Black Monkey Thorn)*, A. erioloba* (Camel Thorn)*, A. mellifera* (Black Thorn)*, A. nilotica* (Scented Thorn)*, A. robusta* (Ankle Thorn) and *A. tortilis* (Umbrella Thorn).

A total of 29 plant species were observed within the proposed servitude (Table 5), but the diversity on a larger scale is expected to be much higher. The vegetation conforms to closed woodland with a particular high density of shrubs in the 1.5 to 3m class, including *Dichrostachys cinerea* (Sickle Bush)*, Combretum hereroense* (Russet Bushwillow)*, Euclea undulata* (Common Guarrie)*, Grewia flava* (Velvet Raisin)*, G. flavescens* (Sandpaper Raisin), *Rhigozum brevispinosum* (Short-thorn Pomegranate) and *Ziziphus mucronata* (Buffalo

Thorn). A relative high density of tall trees (4 – 6m class) is also noted, such as some of the Acacia species, *Combretum imberbe* (Leadwood), *Peltophorum africanum* (Weeping Wattle). High shade conditions result from the high density of the woody stratum, limiting the herbaceous layer to some extent, which is dominated by species adapted to shady conditions such as the grass *Panicum maximum.*

The status of this unit is regarded pristine, but some degradation has resulted due to high grazing pressure, reflected in the presence of forbs such as *Heliotropium ciliatum,* *Kyphocarpha angustifolia* and *Melhania acuminata;* the floristic status is however still regarded as high. Particular mention is made of an exceptional density of the protected tree *Acacia erioloba* (Camel Thorn), rendering this unit highly sensitive. The protected tree *Combretum imberbe* (Leadwood) also occurs scattered at relative low densities. It should be noted that, although no individuals of the protected tree *Boscia albitrunca* (Shepard's Tree) were observed within this unit, it is likely to occur in the area and therefore also in this variation. A medium-low probability of encountering Red Data plant species within this unit is estimated.

The vegetation of this unit is pristine and relatively unaffected by surrounding land transformation and degradation effects and a medium-high floristic status is ascribed to this area. Current impacts include the presence of ashdumps and extensive mining activity immediately to the north of this unit. Although no immediate impacts could be observed, the long-term effects could potentially result in adverse impacts on the vegetation of this area.

Table 5: Species list for the Closed *Acacia erioloba* Woodland unit			
Taxon	**Growth Form**	**Family**	**Status/ Medicinal Properties & Uses**
Acacia burkei	Tree	Mimosaceae	
Acacia erioloba	**Tree**	**Mimosaceae**	**Protected (National Forest Act, 1998)**, fire wood
Acacia mellifera	Shrub	Mimosaceae	Invasive shrub, medicinal
Acacia nilotica	Tree	Mimosaceae	Dyes and tans
Acacia robusta	Tree	Mimosaceae	
Acacia tortilis	Tree	Mimosaceae	Medicinal
Aristida congesta subsp. *congesta*	Grass	Poaceae	Increaser 2. Administered to people.
Aristida stipitata	Grass	Poaceae	
Combretum hereroense	Shrub	Combretaceae	Firewood
Combretum imberbe	**Tree**	**Combretaceae**	**Protected (National Forest Act, 1998)**, fire wood,
Dichrostachys cinerea	Shrub	Mimosaceae	Invasive shrub, medicinal
Eragrostis lehmanniana	Grass	Poaceae	Thatching
Euclea undulata	Shrub	Ebenaceae	Bark & root used medicinally. Browsed by game
Grewia flava	Shrub	Tiliaceae	Administrated to people and animals. Edible & used in making of beer
Grewia flavescens	Shrub	Tiliaceae	Edible & used in making of beer
Heliotropium ciliatum	Forb	Boraginaceae	
Indigofera species	Forb	Fabaceae	

Table 5: Species list for the Closed *Acacia erioloba* Woodland unit			
Taxon	**Growth Form**	**Family**	**Status/ Medicinal Properties & Uses**
Kyphocarpa angustifolia	Forb	Amaranthaceae	
Melhania acuminata	Forb	Malvaceae	Weed
Momordica balsamina	Climber	Cucurbitaceae	
Peltophorum africanum	Tree	Caesalpiniaceae	Medicinal
Pogonarthria squarrosa	Grass	Poaceae	Pioneer grass, Increaser 2. Administrated to people.
Rhigozum brevispinosum	Shrub	Bignoniaceae	
Rhynchosia spectabilis	Forb	Fabaceae	
Schmidtia pappophoroides	Grass	Poaceae	
Stipagrostis uniplumis	Grass	Poaceae	
Urochloa panicoides	Grass	Poaceae	
Ziziphus mucronata	Shrub	Rhamnaceae	Administrated to people. Harmful to people & animals. Applied in magical sense

8.5   Flaveria bidentis *Alluvial Plain*

This unit comprises approximately 10.7% of the proposed servitude. Originally it was assumed that this area represents a degraded part of the region, but closer inspection of the biophysical and physiognomic characteristics revealed that the origin of this unit is more likely to be aquatic, forming an alluvial plain. This is more evident when the area is considered from a larger scale as evidence of flow patterns can be distinguished to the east of this unit, but inundated periods are expected to be extremely infrequent and irregular. The flat topographical characteristic of the region however complicates the identification and accurate delineation of riparian habitat types. This type of plain is normally formed over a long period of time by a river depositing sediment on its floodplain or bed which becomes alluvial soil.

Soils in this area are dark with a clay content of the A- horizon only slightly higher than surrounding areas. The topography of this unit is flat, with slopes generally lower than 2%.

The vegetation of this unit is regarded fairly degraded, comprising a dominant and dense layer of the weed *Flaveria bidentis* (Smelter's Bush); a species native to tropical America. The physiognomy of this unit conforms to open savanna, with scattered Acacia, *Combretum imberbe* (Leadwood*)* and *Peltophorum africanum* (Weeping Wattle) trees. The height of this stratum varies between 4 and 7m. The shrub stratum comprises scattered clumps of *Euclea undulata* (Common Guarrie), *Grewia flava* (Velvet Raisin) and *G. flavescens* (Sandpaper Raisin). The herbaceous layer is poorly represented by grass species; occasional include mostly species that indicate poor habitat conditions such as *Aristida adscensionis, Cynodon dactylon, Melinis nerviglumis* and *Urochloa panicoides.*

While the floristic status of this area is regarded poor (23 species, Table 6), a high sensitivity is ascribed due to the association with moist conditions, even though it likely to

be extremely irregular. A low likelihood of encountering Red Data flora species within this unit is estimated.

Table 6: Species list for the *Flaveria bidentis* Alluvial Plain unit			
Taxon	Growth Form	Family	Status/ Medicinal Properties & Uses
Acacia erioloba	**Tree**	**Mimosaceae**	**Protected (National Forest Act, 1998), fire wood**
Acacia robusta	Tree	Mimosaceae	
Acacia tortilis	Tree	Mimosaceae	Medicinal
Aristida adscensionis L.	Grass	Poaceae	Increaser 2. Administrated to people. Applied in magical sense
Aristida congesta subsp. *barbicollis*	Grass	Poaceae	
Bothriochloa insculpta	Grass	Poaceae	
Cenchrus ciliaris	Grass	Poaceae	Medicinal
Combretum imberbe	**Tree**	**Combretaceae**	**Protected (National Forest Act, 1998), fire wood**
Cynodon dactylon	Grass	Poaceae	Pioneer grass
Eragrostis lehmanniana	Grass	Poaceae	Thatching
Euclea undulata	Shrub	Ebenaceae	Bark & root used medicinally. Browsed by game
Flaveria bidentis	Forb	Asteraceae	Weed
Grewia flava	Shrub	Tiliaceae	Administrated to people and animals. Edible & used in making of beer
Grewia flavescens	Shrub	Tiliaceae	Edible & used in making of beer
Melhania acuminata	Forb	Malvaceae	Weed
Melinis nerviglumis	Grass	Poaceae	Pioneer grass
Peltophorum africanum	Tree	Caesalpiniaceae	Medicinal
Phragmites mauritianus	Sedge	Poaceae	Naturalised
Phyllanthus species	Forb	Euphorbiaceae	
Schmidtia pappophoroides	Grass	Poaceae	
Solanum species	Forb	Solanaceae	Weed
Stipagrostis uniplumis	Grass	Poaceae	
Urochloa panicoides	Grass	Poaceae	

8.6 *Mixed Acacia veld*

This unit comprises approximately 28.6% of the proposed servitude and represents the typical regional vegetation (Limpopo Sweet Bushveld), *albeit* slightly degraded in some parts. Habitat characteristics include red/yellow soils with clay content of the A-horizon slightly higher than the Acacia – *Eragrostis stipitata* Sandveld unit. The slope in this unit is typically flat, generally lower than 3%.

A total of 48 species were observed in this unit. The physiognomy is dominated by a mixture of woodland and savanna areas, trees occurring scattered in clumps with prominent shrubs in-between. Prominent woody species include *Acacia burkei* (), *A. erioloba* (Camel Thorn), *A. erubescens* (Blue Thorn), *A. nigrescens* (Knob Thorn), *Acacia nilotica* (Scented Thorn), *Combretum imberbe* (Leadwood), *Peltophorum africanum* (Weeping Wattle) as well as the tall shrubs *Acacia mellifera* (Black Thorn), *Boscia foetida* (Stink Bush), *Combretum*

hereroense (Russet Bushwillow), *Commiphora pyracanthoides* (Common Corkwood), *Dichrostachys cinerea* (Sickle Bush), *Euclea undulata* (Common Guarrie), *Grewia flava* (Velvet Raisin), *Rhigozum brevispinosum* (Short-thorn Pomegranate) and *Ziziphus mucronata* (Buffalo Thorn).

The herbaceous layer indicates moderate levels of utilisation with extensive stands of weeds in some areas, mostly *Melhania acuminata.* Other prominent herbs encountered in this unit include *Ammocharis coranica, Dicoma tomentosa, Heliotropium ciliatum, Indigofera* species, *Tylosema fassoglense* and *Vernonia sutherlandii.* The grass layer is diverse, but a low number of species tend to dominate, including *Aristida adscensionis, Cenchrus ciliaris, Digitaria eriantha, Eragrostis lehmanniana, E. lehmanniana, Panicum maximum* and *Schmidtia pappophoroides.*

The vegetation of this unit is relative pristine and shows some signs of surrounding land transformation and degradation effects; a medium floristic status is therefore ascribed to this area. A medium-low likelihood of encountering Red Data flora species within this unit is estimated. The protected trees *Acacia erioloba* (Camel Thorn) and *Combretum imberbe* (Leadwood) are present throughout this unit. A high likelihood of *Boscia albitrunca* (Shepard's Tree) being present in this unit is also estimated.

Table 7: Species list for the Mixed Acacia Veld unit			
Taxon	**Growth Form**	**Family**	**Status/ Medicinal Properties & Uses**
Abutilon austro-africanum	Forb	Malvaceae	
Acacia burkei	Tree	Mimosaceae	
Acacia erioloba	**Tree**	**Mimosaceae**	**Protected (National Forest Act, 1998), fire wood**
Acacia erubescens	Tree	Mimosaceae	Edible gum
Acacia mellifera	Shrub	Mimosaceae	Invasive shrub, medicinal
Acacia nigrescens	Tree	Mimosaceae	
Acacia nilotica	Tree	Mimosaceae	Dyes and tans
Acacia species	Tree	Mimosaceae	
Acacia tortilis	Tree	Mimosaceae	Medicinal
Acacia xanthophloea	Tree	Mimosaceae	
Alternanthera pungens	Forb	Amaranthaceae	Weed
Ammocharis coranica	Geophyte	Amaryllidaceae	
Aristida adscensionis L.	Grass	Poaceae	Increaser 2. Administered to people. Applied in magical sense
Aristida congesta subsp. *barbicollis*	Grass	Poaceae	
Aristida congesta subsp. *congesta*	Grass	Poaceae	Increaser 2. Administered to people.
Aristida stipitata	Grass	Poaceae	
Barleria affinis	Forb	Acanthaceae	
Boscia foetida	Shrub	Capparaceae	Medicinal
Bothriochloa insculpta	Grass	Poaceae	
Cenchrus ciliaris	Grass	Poaceae	Medicinal
Combretum hereroense	Shrub	Combretaceae	Firewood
Combretum imberbe	**Tree**	**Combretaceae**	**Protected (National Forest Act, 1998), fire wood**

Table 7: Species list for the Mixed Acacia Veld unit			
Taxon	Growth Form	Family	Status/ Medicinal Properties & Uses
Commelina africana	Forb	Commelinaceae	Medicinal
Commiphora pyracanthoides	Shrub	Burseraceae	Household
Dichrostachys cinerea	Shrub	Mimosaceae	Invasive shrub, medicinal
Dicoma tomentosa	Forb	Asteraceae	
Digitaria eriantha	Grass	Poaceae	Increaser 2. Administrated to people. Harmful to people & animals. Applied in magical sense
Ehretia rigida	Shrub	Ehretiaceae	
Eragrostis lehmanniana	Grass	Poaceae	Thatching
Eragrostis rigidior	Grass	Poaceae	
Eragrostis superba	Grass	Poaceae	
Euclea undulata	Shrub	Ebenaceae	Bark & root used medicinally. Browsed by game
Grewia bicolor	Shrub	Tiliaceae	Edible & used in making of beer
Grewia flava	Shrub	Tiliaceae	Administrated to people and animals. Edible & used in making of beer
Grewia flavescens	Shrub	Tiliaceae	Edible & used in making of beer
Grewia occidentalis	Shrub	Tiliaceae	Administrated to people. Bark and leaves are used medicinally
Heliotropium ciliatum	Forb	Boraginaceae	
Heteropogon contortus	Grass	Poaceae	Increaser 2. Administrated to people. Harmful to people & animals.
Indigofera species	Forb	Fabaceae	
Ledebouria ovalifolia	Geophyte	Liliaceae	
Melhania acuminata	Forb	Malvaceae	Weed
Panicum maximum	Grass	Poaceae	
Peltophorum africanum	Tree	Caesalpiniaceae	Medicinal
Rhigozum brevispinosum	Shrub	Bignoniaceae	
Schmidtia pappophoroides	Grass	Poaceae	
Tylosema fassoglense	Forb	Caesalpiniaceae	Medicinal
Vernonia sutherlandii	Forb	Asteraceae	
Ziziphus mucronata	Shrub	Rhamnaceae	Administrated to people. Harmful to people & animals. Applied in magical sense

8.7   *Transformed Habitat*

This habitat type represents areas where historical or recent human activities led to transformation of the natural vegetation. No natural vegetation remains in these areas and the floristic status of these areas is therefore regarded low as a result of the secondary vegetation that characterises this community. No surveys were conducted in these areas. The likelihood of encountering Red Data species within these areas are regarded low.

Floristic Habitat Types
- Acacia – Eragrostis stipitata Sandveld
- Closed Acacia erioloba Woodland
- Flaveria bidentis Alluvial Plain
- Mixed Acacia Veld
- Transformed Habitat
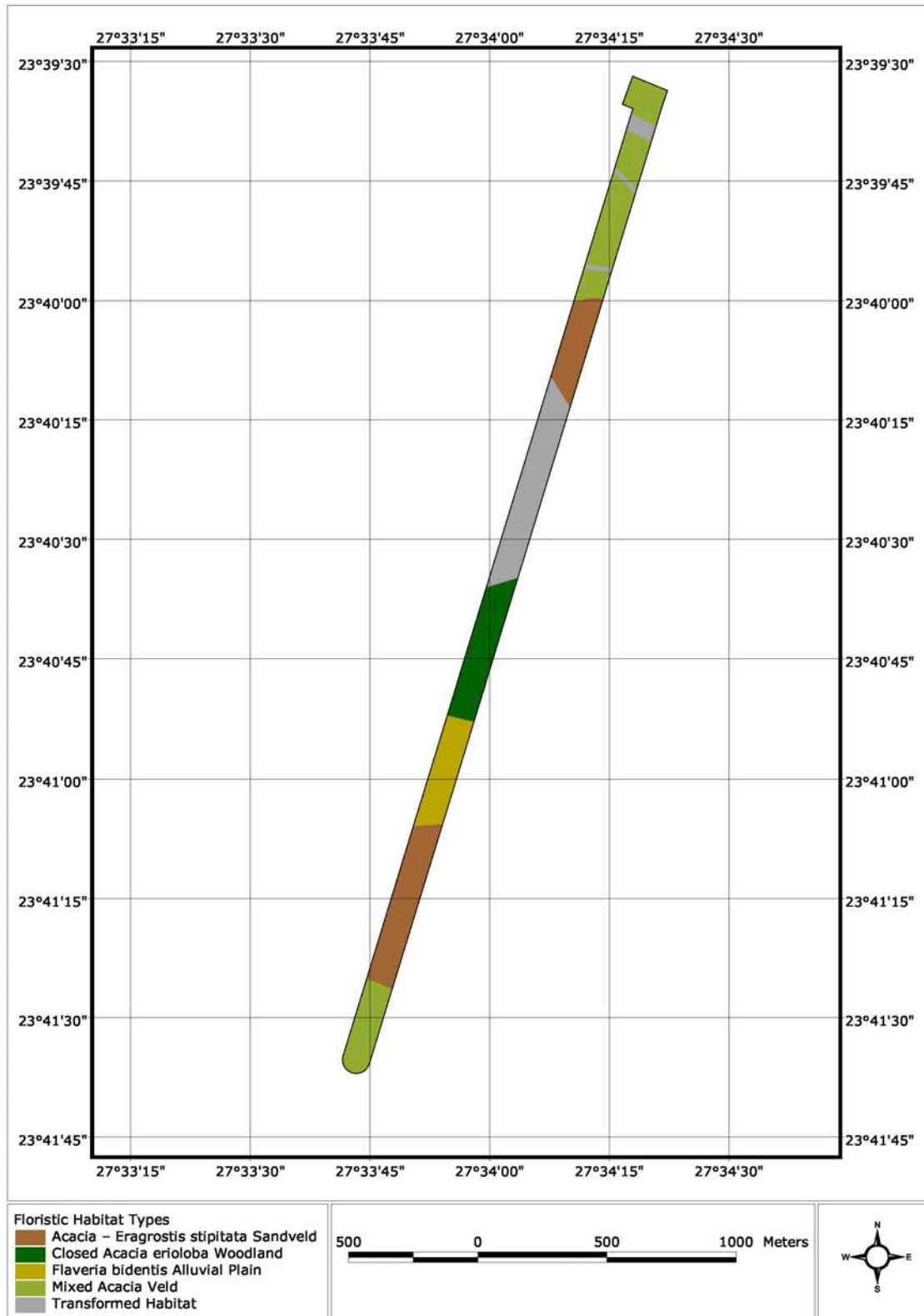
Figure 4: Floristic habitat types of the proposed servitude

8.8   Flora Species of Conservation Importance

The conservation status of plants (SANBI) has been classified according to the old IUCN Red Listed categories of 1986. The categories used in the old Red Listed classification are Extinct, Endangered, Vulnerable, Rare, Indeterminate, Insufficiently Known, Not Threatened and No Information. Endangered taxa are taxa in danger of extinction and are unlikely to survive if the current situation continues. Vulnerable species are taxa that are likely to move into the Endangered category in the near future if the factors causing the decline continue to be occur.

Rare taxa are taxa with small populations that are not classified as Endangered or Vulnerable, but are at risk as an unexpected threat may cause a decline in the population. Indeterminate taxa are taxa known to be in one of the four above categories, but insufficient information is available to determine which of the four categories. Insufficiently Known taxa are suspected to belong to one of the above categories, but this is not known for certain as there is a lack of information available on the species (Hilton-Taylor, 1996).

Not Threatened taxa are taxa that are no longer included in any of the threatened categories due to an increase in the population size or the discovery of more individuals or populations. No Information includes taxa without any information available. The Rare category is seen as similar to the Near Threatened category in the new classification and the Insufficiently Known category seems to be similar to the Data Deficient category in the new classification.

SANBI records for the region indicate the presence of 3 Red Data flora species (Table 8, **bold**). None of these species were observed during the site investigations and available habitat in the study area is not considered suitable for these particular species. The protected trees *Acacia erioloba* (Camel Thorn) and *Combretum imberbe* (Leadwood) are present throughout this area; a particular dense stand of *Acacia erioloba* is present in the Closed *Acacia erioloba* Woodland unit. It is also considered highly likely that *Boscia albitrunca* (Shepard's Tree) is present in the area, although not noted during the surveys.

Table 8: Flora species of conservation importance of the region				
Species	**Family**	**Status**	**Growth Form**	**Probability**
Acacia erioloba	Mimosaceae	Protected	Tree	CONFIRMED
Acalypha caperonioides var. ***caperonioides***	**Euphorbiaceae**	**Data Deficient**	**Dwarf shrub, herb**	**Low**
Adansonia digitata	Bombacaceae	Protected tree	Tree, succulent	Moderate/Low
Boscia albitrunca	Capparaceae	Protected tree	Tall shrub	High
Combretum imberbe	Combretaceae	Protected tree	Tree	CONFIRMED
Corchorus psammophilus	**Malvaceae**	**Threatened**	**Herb**	**Low**
Euphorbia waterbergensis	**Euphorbiaceae**	**Rare**	**Shrub, succulent**	**Low**
Piaranthus atrosanguinalis	Apocynaceae	Bushveld endemic	Perennial, succulent	Low
Sclerocarya birrea	Anacardiaceae	Protected Tree	Tree	High

8.9   Floristic Sensitivity

Floristic sensitivity values are ascribed on the basis of the status of habitat within land parcels and not specifically per habitat type. It therefore implies that two areas of the same habitat type may exhibit different floristic sensitivities, based on the status of remaining natural vegetation within the respective parcels. This sensitivity also takes into account the regional conservation status of the vegetation (Limpopo Sweet Bushveld, Least Concern). Floristic sensitivities for the respective habitat types were calculated in the following table and illustrated in Figure 4.

Criteria	RD/ Protected plants	Landscape sensitivity	Ecology Status	Species diversity	Functionality/ fragmentation	TOTAL	SENSITIVITY INDEX	SENSITIVITY CLASS
Community	Criteria Ranking							
Acacia – *Eragrostis stipitata* Sandveld	7	4	6	6	5	167	58%	Medium
Closed *Acacia erioloba* Woodland	9	8	9	8	8	248	86%	High
Flaveria bidentis Alluvial Plain	6	8	7	5	8	194	67%	Medium-High
Mixed Acacia Veld	7	4	6	6	5	167	58%	Medium
Transformed Habitat	1	1	1	2	2	34	12%	Low
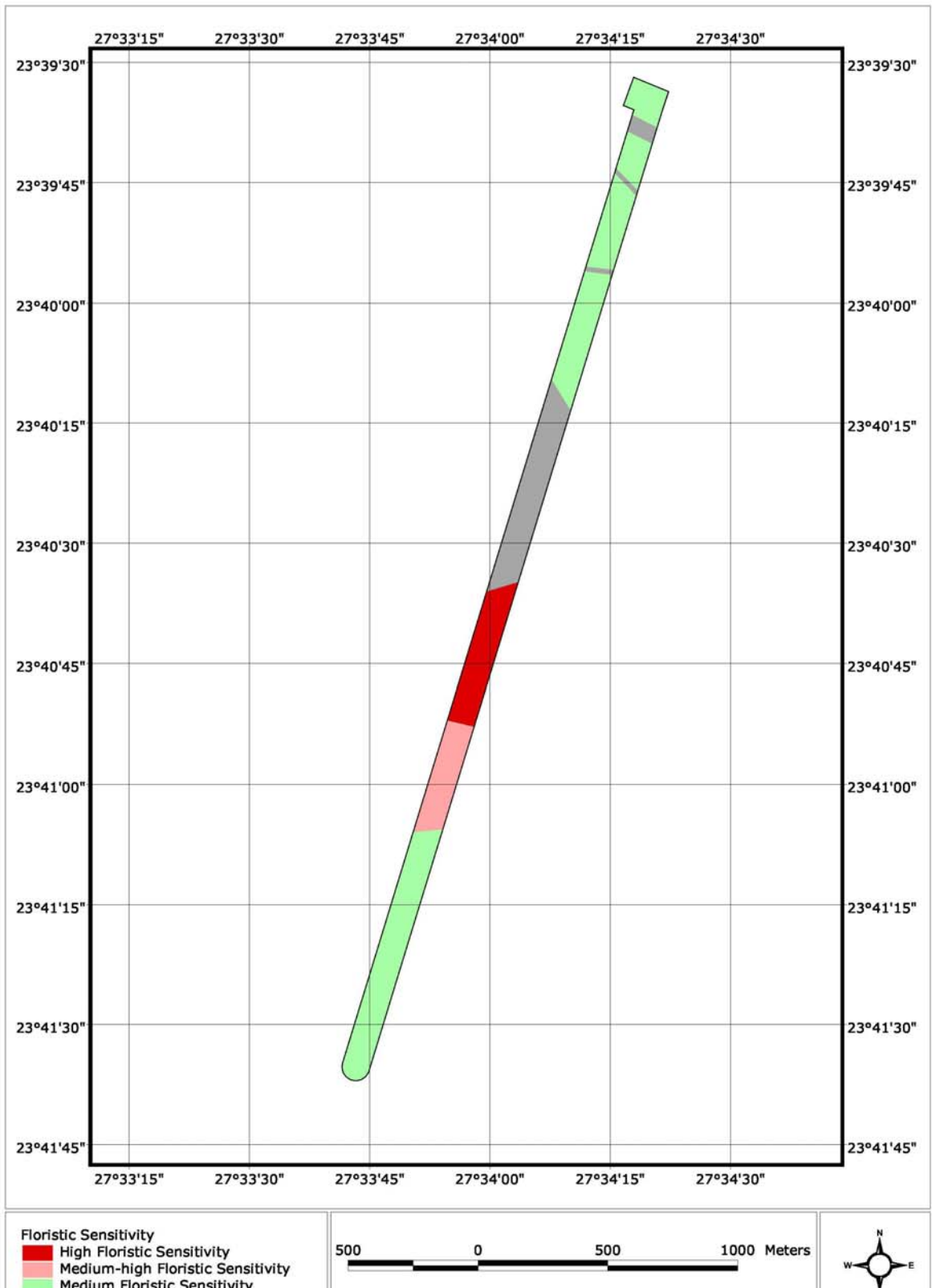
Figure 5: Floristic sensitivities of habitat types within the servitude

9 FAUNA OF THE STUDY AREA

The close relationship between vegetation units and specific faunal composition has been noted in several scientific studies. For the purpose of this investigation the floristic units identified in the floristic assessment (Section 8) are therefore also considered representative of the faunal assemblages.

9.1 Faunal Habitat

Results of the photo analysis and site investigations revealed the presence of the following floristic habitat types (Figure 3):

- Acacia – *Eragrostis stipitata* Sandveld;
- Closed *Acacia erioloba* Woodland;
- *Flaveria bidentis* Alluvial Plain;
- Mixed Acacia Veld; and
- Transformed Habitat.

The extent of habitat types within the study area is presented in Table 3.

9.2 *Acacia –* Eragrostis stipitata *Sandveld*

This unit comprises 25.3% of the proposed servitude and is situated adjacent to the Mixed *Acacia* veld at the northern and southern ends of the study area, representing untransformed faunal habitat that exhibit high levels of connectivity to adjacent areas of untransformed woodland and only animal species unable to cross roads and fences will be excluded from the untransformed woodland of the study area. The *Acacia – Eragrostis stipitata* sandveld does not exhibit any significant or unique faunal habitat attributes such as wetland elements, slope or areas of high rockiness. This habitat type occurs commonly in the general region. Faunal assemblages likely to persist in this habitat type are expected to be typical of the larger region; the biodiversity elements of this faunal habitat type likely to be the mean of the study area and surrounding untransformed woodland. It is regarded unlikely that specialist assemblages (such as those associated with wetlands or significantly rocky areas) will be located here.

Fauna species that are expected to occupy this habitat type *Aloeides aranda* (Aranda Copper), *Byblia ilithyia* (Spotted Joker), *Charaxes jasius* (Foxy Charaxes), *Colotis ione* (Bushveld Purple Tip), *Merops persicus* (Blue-cheeked Bee-eater), *Phoeniculus purpureus* (Green Wood-Hoopoe), *Tockus nasutus* (African Grey Hornbill), *Lanius minor* (Lesser Grey Shrike), *Canis mesomelas* (Black-backed Jackal), *Orycteropus afer* (Aardvark), *Schismaderma carens* (Red Toad), *Bitis caudalis* (Horned Adder), *Naja mossambica* (M'Fezi), *Pternistis natalensis* (Natal Spurfowl), *Otus senegalensis* (African Scops-owl), *Lepus saxatilis* (Scrub Hare), *Mungos mungo* (Banded Mongoose) and *Ictonyx striatus* (Striped Polecat).

A moderate faunal sensitivity is ascribed to this habitat type.

9.3   *Closed* Acacia erioloba *Woodland*

This unit comprises 13.6% of the proposed servitude. The closed *Acacia erioloba* woodland of the study area is located to the south of the transformed areas and north of the *Flaveria bidentis* alluvial plain. This woodland exhibit relative high levels of connectivity to other untransformed faunal habitat types. This faunal habitat does not exhibit any significant or unique faunal habitat attributes such as wetland elements, slope or rockiness. However, although the faunal habitat elements found in this habitat type are found commonly in the region, the nature of the woodland (in particular the density of large trees) is dissimilar to surrounding habitat. The closed nature of these woodland areas provides in the needs of certain fauna species in terms of higher levels of shelter and feeding habitat commonly present in surrounding open woodland of the region.

Species that are likely to occur in the closed *Acacia erioloba* woodland are typical of the larger region; however, some species might be found in this habitat type that are absent from the other woodland habitat types located in the study area. Species that are likely to occur in these parts include *Azanus moriqua* (Thorn-tree Blue)*, Pinacopteryx eriphia* (Zebra White)*, Falco rupicolis* (Greater Kestrel)*, Prinia subflava* (Tawny-flanked Prinia)*, Batis molitor* (Chinspot Batis)*, Chamaeleo dilepis* (Flap-neck Chameleon)*, Dendroaspis polylepis* (Black Mamba)*, Dispholidus typus* (Boomslang)*, Philothamnus semivariegatus* (Spotted Bush Snake)*, Glaucidium perlatum* (Pearl-spotted Owlet)*, Oriolus larvatus* (Black-headed Oriole)*, Muscicapa striata* (Spotted Flycatcher)*, Caracal caracal* (Caracal)*, Neoromicia capensis* (Cape Serotine Bat)*, Polemaetus bellicosus (*VU – Martial Eagle) and *Bubo africanus* (Spotted Eagle-owl).

A moderate-high faunal sensitivity is ascribed to these parts of the study area.

9.4   **Flaveria bidentis** *Alluvial Plain*

This unit comprises approximately 10.7% of the proposed servitude and is located immediately south of the closed *Acacia erioloba* woodland. Because of the association with periods of high moisture, albeit extremely infrequent, this area is regarded fairly unique faunal habitat type. It furthermore exhibits high levels of connectivity to surrounding areas of natural habitat. Wetland elements associated with this area provide suitable habitat for species that might otherwise be absent from the area. This is particularly true for groups such as frogs and water birds. Furthermore, wetlands located in the dry regions of Southern Africa are poorly understood and most likely underestimated in terms of national importance and ecosystem services such as clean water. The importance and sensitivity of such areas can therefore not be over-emphasized.

The faunal communities likely to persist in the *Flaveria bidentis* alluvial plain of the study area include communities that are typical of the larger region; however, it is likely that species are to be found here that would otherwise be considered unlikely residents of the surrounding areas. These particular species include *Amietophrynus garmani* (Eastern Olive Toad), *Phrynobatrachus natalensis* (Snoring Puddle Frog), *Python natalensis* (SA Python), *Varanus albigularis* (Rock Monitor), *Lemniscomys rosalia* (DD - Single-striped Mouse), *Civettictis civetta* (Civet) and *Kobus ellipsiprymnus* (Waterbuck).

A high faunal sensitivity is ascribed to this habitat type.

9.5 *Mixed Acacia veld*

This unit comprises approximately 28.6% of the proposed servitude. The mixed *Acacia* veld faunal habitat fragments are found at both the northern and southern ends of the study area, representing untransformed faunal habitat that exhibit high levels of connectivity to adjacent areas of untransformed woodland. Only some fauna species that are unable to cross roads and fences will be excluded from the untransformed woodland of the study area. The Mixed *Acacia* veld of the study area does not include any significant or unique habitat characteristics such as wetland elements, slope or rockiness. It is typical of the region in which the study area is located and the habitat characteristics found here abounds throughout the region.

The faunal communities likely to persist in the mixed *Acacia* veld of the study area are also typical of the larger region; the biodiversity elements of this faunal habitat type likely to be the mean of the study area and surrounding untransformed woodland. It is unlikely that specialist assemblages (such as those found in wetlands or in significantly rocky areas) will be present within this habitat type. Species that are likely to occur in the mixed *Acacia* veld of the study area include *Gegenes pumilio* (Dark Hottentot Skipper), *Hyalites eponina* (Dancing Acraea), *Junonia hierta* (Yellow Pansy), *Heliobolus lugubris* (Bushveld Lizard), *Pternistis swainsonii* (Swainson's Spurfowl), *Numida meleagris* (Helmeted Guineafowl), *Tockus leucomelas* (Southern Yellow-billed Hornbill), *Prinia subflava* (Tawny-flanked Prinia), *Breviceps adspersus* (Bushveld Rain Frog), *Bitis arietans* (Puff Adder), *Peliperdix coqui* (Coqui Francolin), *Paraxerus cepapi* (Tree Squirrel), *Genetta tigrina* (Large-spotted Genet.), *Aethomys namaquensis* (Namaqua Rock Mouse) and *Galerella sanguinea* (Slender Mongoose).

The Mixed *Acacia* veld was ascribed a moderate faunal sensitivity.

9.5.1 Transformed Areas

This habitat type comprises 21.8% of the proposed conveyor. No natural habitat remains in this unit as all vegetation has been transformed. Two distinctly different transformed faunal habitat types are recognised, namely roads and mining areas. Roads represent linear areas of transformation where natural vegetation has been cleared, consisting of a fairly narrow and compacted substrate (dirt or tar). While they do represent a barrier to a small portion of the faunal species occupying the region, most animal species are able to cross these roads and are not affected in their movement patterns. However, roads do represent a constant threat to animals as accidental death frequently happen during crossing. Roads therefore contribute moderately towards habitat fragmentation and isolation, but not significantly towards habitat loss. In contrast, mining areas represent parts where significant habitat loss occurred, representing ecological wastelands that are significant barriers to a number of species. These areas contribute significantly towards habitat loss and fragmentation of natural habitat.

It is unlikely that any faunal species or assemblage will utilize the transformed faunal habitat in the study area. No Red Data species are expected to occur in these areas, except potentially in passing. The transformed faunal habitat has very low faunal value and biodiversity potential. It is considered to have a low faunal sensitivity with regards to the proposed development and associated impacts on the fauna of the study area.

The faunal diversity of this area is extremely low and constitutes some bird species that are associated with transformed habitat types.

9.6 Regional Diversity & Red Data Probabilities

9.6.1 Invertebrates

A total of 13 butterflies known to occur in the 2327DA Q-grid were observed in the study area. No Red Data species are known from this specific Q-grid.

Table 9: Invertebrate species of the study area			
Species Details			**Result**
Biological Name	**English Name**	**Status**	**Probability**
Aloeides aranda	Aranda Copper	Least Threatened	confirmed
Azanus moriqua	Thorn-tree Blue	Least Threatened	confirmed
Byblia ilithyia	Spotted Joker	Least Threatened	confirmed
Catopsilla florella	African Migrant	Least Threatened	confirmed
Charaxes jasius	Foxy Charaxes	Least Threatened	confirmed
Colotis ione	Bushveld Purple Tip	Least Threatened	confirmed
Danaus chryssipus	African Monarch	Least Threatened	confirmed
Eurema brigitta	Broad-bordered Grass Yellow	Least Threatened	confirmed
Gegenes pumilio	Dark Hottentot Skipper	Least Threatened	confirmed
Hyalites eponina	Dancing Acraea	Least Threatened	confirmed

Table 9: Invertebrate species of the study area			
Species Details			**Result**
Biological Name	**English Name**	**Status**	**Probability**
Junonia hierta	Yellow Pansy	Least Threatened	confirmed
Phalanta phalantha	African Leopard	Least Threatened	confirmed
Pinacopteryx eriphia	Zebra White	Least Threatened	confirmed

9.6.2 Amphibians

A total of 17 frog species are listed for the 2327DA Q-grid. It includes one Red Data species, *Pyxicephalus adspersus* (NT), which is estimated to have a moderate-low probability of occurring in the study area. Two species, *Amietia angolensis* and *Xenopus laevis* are unlikely to occur in the study area (low probability). It is estimated that 4 species have a moderate-low probability of occurring, 5 species a moderate and 6 species a high probability (Table 10).

Table 10: Amphibian species of the region			
Species Details			**Result**
Biological Name	**English Name**	**Status**	**Probability**
Amietia angolensis	Common River Frog	Least Threatened	low
Amietophrynus garmani	Eastern Olive Toad	Least Threatened	high
Amietophrynus gutturalis	Gutttural Toad	Least Threatened	high
Amietophrynus maculatus	Flat-backed Toad	Least Threatened	moderate-low
Amietophrynus rangeri	Raucous Toad	Least Threatened	moderate
Breviceps adspersus	Bushveld Rain Frog	Least Threatened	high
Cacosternum boettgeri	Boettger's Caco	Least Threatened	high
Chiromantis xerampelina	Southern Foam Nest Frog	Least Threatened	moderate-low
Hildebrantia ornata	Ornate Frog	Least Threatened	moderate
Kassina senegalensis	Bubbling Kassina	Least Threatened	moderate
Phrynobatrachus natalensis	Snoring Puddle Frog	Least Threatened	high
Phrynomantis bifasciatus	Banded Rubber Frog	Least Threatened	moderate
Ptychadena anchietae	Plain Grass Frog	Least Threatened	moderate-low
Pyxicephalus adspersus	Giant Bullfrog	Near Threatened	moderate-low
Schismaderma carens	Red Toad	Least Threatened	high
Tomopterna cryptotis	Tremelo Sand Frog	Least Threatened	moderate
Xenopus laevis	Common Platanna	Least Threatened	low

9.6.3 Reptiles

A total of 18 reptile species are listed for the 2327DA Q-grid. It includes no Red Data species. One species, *Heliobolus lugubris*, were confirmed for the study area. A high likelihood of occurring in the study area is estimated for the remaining 17 reptile species (Table 11).

Table 11: Reptile species of the region			
Species Details			Result
Biological Name	English Name	Status	Probability
Acontias percivali	Percival's Legless Skink	Least Threatened	high
Bitis arietans	Puff Adder	Least Threatened	high
Bitis caudalis	Horned Adder	Least Threatened	high
Chamaeleo dilepis	Flap-neck Chameleon	Least Threatened	high
Dendroaspis polylepis	Black Mamba	Least Threatened	high
Dispholidus typus	Boomslang	Least Threatened	high
Heliobolus lugubris	Bushveld Lizard	Least Threatened	confirmed
Hemidactylus mabouia	Moreau's Tropical House Gecko	Least Threatened	high
Leptotyphlops scutifrons	Peters' Thread Snake	Least Threatened	high
Lygodactylus capensis	Cape Dwarf Gecko	Least Threatened	high
Naja annulifera	Snouted Cobra	Least Threatened	high
Naja mossambica	M'fezi	Least Threatened	high
Philothamnus semivariegatus	Spotted Bush Snake	Least Threatened	high
Python natalensis	Southern African Python	Least Threatened	high
Stigmochelys pardalis	Leopard Tortoise	Least Threatened	high
Trachylepis capensis	Cape Skink	Least Threatened	high
Trachylepis varia	Variable Skink	Least Threatened	high
Varanus albigularis	Rock Monitor	Least Threatened	high

9.6.4 Avifauna

A total of 394 bird species are listed for the 2327DA Q-grid (Table included as Addendum 1), including 30 Red Data species including 16 Near Threatened, 13 Vulnerable and one Endangered (*Ephippiorhynchus senegalensis*). Twenty-three species were confirmed for the study area. Probabilities of occurring in the study area are estimated as follows:

- 146 species have a low probability of occurring in the study area (including 14 Red Data species);
- 73 species have a moderate-low probability (including 6 Red Data species);
- 48 species have a moderate (including 7 Red Data species);
- 44 species have a moderate-high (including 3 Red Data species); and
- 60 species have a high probability of occurring.

9.6.5 Mammals

A total of 68 mammal species is listed for the 2327D Q-grid A, including 15 Red Data species. Thirteen species, *Aepyceros melampus, Canis mesomelas, Cercopithecus aethiops, Connachaetus taurinus, Cryptomys hottentotus, Equus burchelli, Hystrix africaeaustralis, Kobus ellipsiprymnus, Orycteropus afer, Papio ursinus, Phacochoerus africanus, Raphicerus campestris* and *Tragelaphus strepsiceros* were confirmed during the site visit. Probabilities of occurring in the study area are estimated as follows:

- 8 species have a low probability of occurring in the study area;

- species have a moderate-low probability of occurring in the study area (including 4 Red Data species);

- 16 species have a moderate probability of occurring in the study area (including 7 Red Data species);

- 9 species have a moderate-high probability of occurring in the study area (including 3 Red Data species); and

- 13 species are considered highly likely to occur in the study area (including the Red Data species *Tatera leucogaster*).

Table 12: Mammal species for the region			
Species Details			**Result**
Biological Name	**English Name**	**Status**	**Probability**
Acomys spinosissimus	Spiny Mouse	Least Threatened	moderate-low
Aepyceros melampus	Impala	Least Threatened	confirmed
Aethomys chrysophilus	Red Veld Rat	Least Threatened	high
Aethomys namaquensis	Namaqua Rock Mouse	Least Threatened	high
Aonyx capensis	Cape Clawless Otter	Least Threatened	low
Atelerix frontalis	South African Hedgehog	Near Threatened	moderate
Atilax paludinosus	Water Mongoose	Least Threatened	low
Canis mesomelas	Black-backed Jackal	Least Threatened	confirmed
Caracal caracal	Caracal	Least Threatened	high
Cercopithecus aethiops	Vervet Monkey	Least Threatened	confirmed
Civettictis civetta	African Civet	Least Threatened	high
Connachaetus taurinus	Blue Wildebeest	Least Threatened	confirmed
Crocidura cyanea	Reddish-grey Musk Shrew	DD	moderate
Crocidura hirta	Lesser Red Musk Shrew	DD	moderate
Cryptomys hottentotus	Common Mole-rat	Least Threatened	confirmed
Elephantulus intufi	Bushveld Elephant Shrew	Data Deficient	moderate
Elephantulus myurus	Rock Elephant Shrew	Least Threatened	moderate-low
Equus burchellii	Plains Zebra	Least Threatened	confirmed
Felis silvestris	African Wild Cat	Least Threatened	moderate
Galago moholi	Southern Lesser Galago	Least Threatened	moderate-high
Galerella sanguinea	Slender Mongoose	Least Threatened	high
Genetta genetta	Small-spotted Genet	Least Threatened	high
Genetta tigrina	Large-spotted Genet	Least Threatened	high
Graphiurus murinus	Woodland Dormouse	Least Threatened	moderate
Helogale parvula	Dwarf Mongoose	Least Threatened	moderate
Hyaena brunnea	Brown Hyaena	Near Threatened	moderate
Hystrix africaeaustralis	Porcupine	Least Threatened	confirmed
Ictonyx striatus	Striped Polecat	Least Threatened	high
Kobus ellipsiprymnus	Waterbuck	Least Threatened	confirmed
Lemniscomys rosalia	Single-striped Mouse	Data Deficient	moderate-high
Leptailurus serval	Serval	Near Threatened	moderate-low
Lepus saxatilis	Scrub Hare	Least Threatened	high
Manis temminckii	Pangolin	Vulnerable	moderate
Mellivora capensis	Honey Badger	Near Threatened	moderate-high
Miniopterus schreibersii	Schreiber's Long-fingered Bat	Near Threatened	moderate-low
Mungos mungo	Banded Mongoose	Least Threatened	high

Table 12: Mammal species for the region			
Species Details			**Result**
Biological Name	**English Name**	**Status**	**Probability**
Neoromicia capensis	Cape Serotine Bat	Least Threatened	high
Neoromicia zuluensis	Aloe Bat	Least Threatened	moderate-low
Nycteris thebaica	Egyptian Slit-faced Bat	Least Threatened	moderate-low
Oreotragus oreotragus	Klipspringer	Least Threatened	low
Orycteropus afer	Aardvark	Least Threatened	confirmed
Otocyon megalotis	Bat-eared Fox	Least Threatened	moderate
Otomys angoniensis	Angoni Vlei Rat	Least Threatened	low
Panthera pardus	Leopard	Least Threatened	moderate-low
Papio ursinus	Chacma Baboon	Least Threatened	confirmed
Paraxerus cepapi	Tree Squirrel	Least Threatened	high
Pedetes capensis	Springhare	Least Threatened	moderate
Phacochoerus africanus	Warthog	Least Threatened	confirmed
Pipistrellus hesperidus	African Pipistrelle	Least Threatened	moderate-high
Pipistrellus rusticus	Rusty Bat	Near Threatened	moderate-high
Poecilogale albinucha	African Weasel	Data Deficient	moderate
Potamochoerus porcus	Bushpig	Least Threatened	low
Procavia capensis	Rock Hyrax	Least Threatened	low
Pronolagus randensis	Jameson's Red Rock Rabbit	Least Threatened	low
Proteles cristatus	Aardwolf	Least Threatened	moderate-high
Raphicerus campestris	Steenbok	Least Threatened	confirmed
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	Near Threatened	moderate-low
Rhinolophus darlingi	Darling's Horseshoe Bat	Least Threatened	moderate-low
Saccostomys campestris	Pouched Mouse	Least Threatened	moderate
Scotophilus dinganii	Yellow House Bat	Least Threatened	moderate-high
Steatomys pratensis	Fat Mouse	Least Threatened	moderate
Sylvicapra grimmia	Common Duiker	Least Threatened	moderate-high
Taphozous mauritianus	Mauritian Tomb Bat	Least Threatened	moderate-high
Tatera leucogaster	Bushveld Gerbil	Data Deficient	high
Thallomys paedulcus	Tree Rat	Least Threatened	moderate
Thryonomys swinderianus	Greater Cane Rat	Least Threatened	low
Tragelaphus strepsiceros	Kudu	Least Threatened	confirmed
Vulpes chama	Cape Fox	Least Threatened	moderate

9.7 Faunal Sensitivity

Based on the ecological status, biodiversity value, fragmentation levels and transformed nature of each of the five faunal habitat types found in the study area, faunal sensitivities were calculated in Table 13 and is based on the nature of the proposed project and its associated impacts. Note that faunal sensities are based on free roaming aninals and the presence of fences is not taken into consideration as it does not influence the majority of animals that are likely to utilise this area. Faunal sensitivities are illustrated in Figure 5.

Table 13: Faunal sensitivities for habitat types					
Habitat Types	Habitat Diversity	Ecological Potential	Biodiversity Contribution	Total	Sensitivity
Acacia - *Eragrostis stipitata* veld	5	5	5	50.0%	Medium
Closed *Acacia erioloba* woodland	8	8	7	76.7%	Medium-high
Flaveria bidentis alluvial plain	8	8	9	83.3%	High
Mixed Acacia Veld	5	6	5	53.3%	Medium
Transformed Habitat	0	1	1	6.7%	Low

The linear nature as well as the relative short distance of the proposed conveyor section is expected to limit the loss of natural habitat, particularly in comparison with the extent of habitat loss that resulted from the construction of the nearby Medupi Power Station as well as open cast mining operations at the Grootegeluk mine.

The most significant impact of the conveyor is the physical barrier that will be created for a variety of animal species likely to be found in the study area and surrounding regions. The movement of medium-sized and larger land-bound animals can potentially be restricted significantly if they have no way to cross this servitude that will be fenced off by a high density fence, unlike game fences that would allow many species free movement and which are specifically constructed to restrict movement of only large animal species. An important aspect with regards to available water source is illustrated Figure 6. Movement of animals from the eastern side of the study area region to this source of water will be affected significantly if no allowance is made for movement of larger animals. A similar impact is presented by fence lines of the game farms, but not to the extent that the conveyor servitude will present.
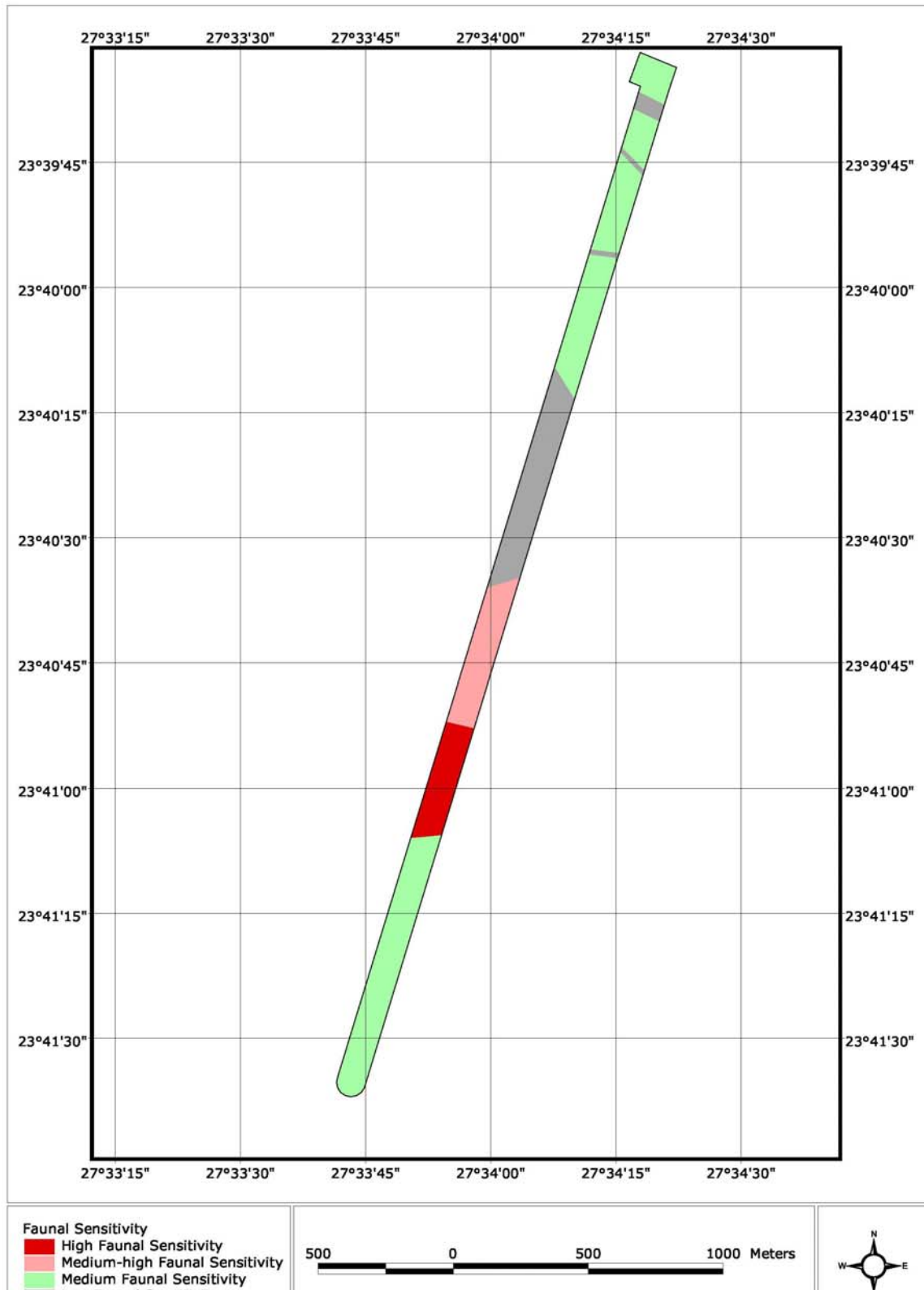
Figure 6: Faunal sensitivity of the study area

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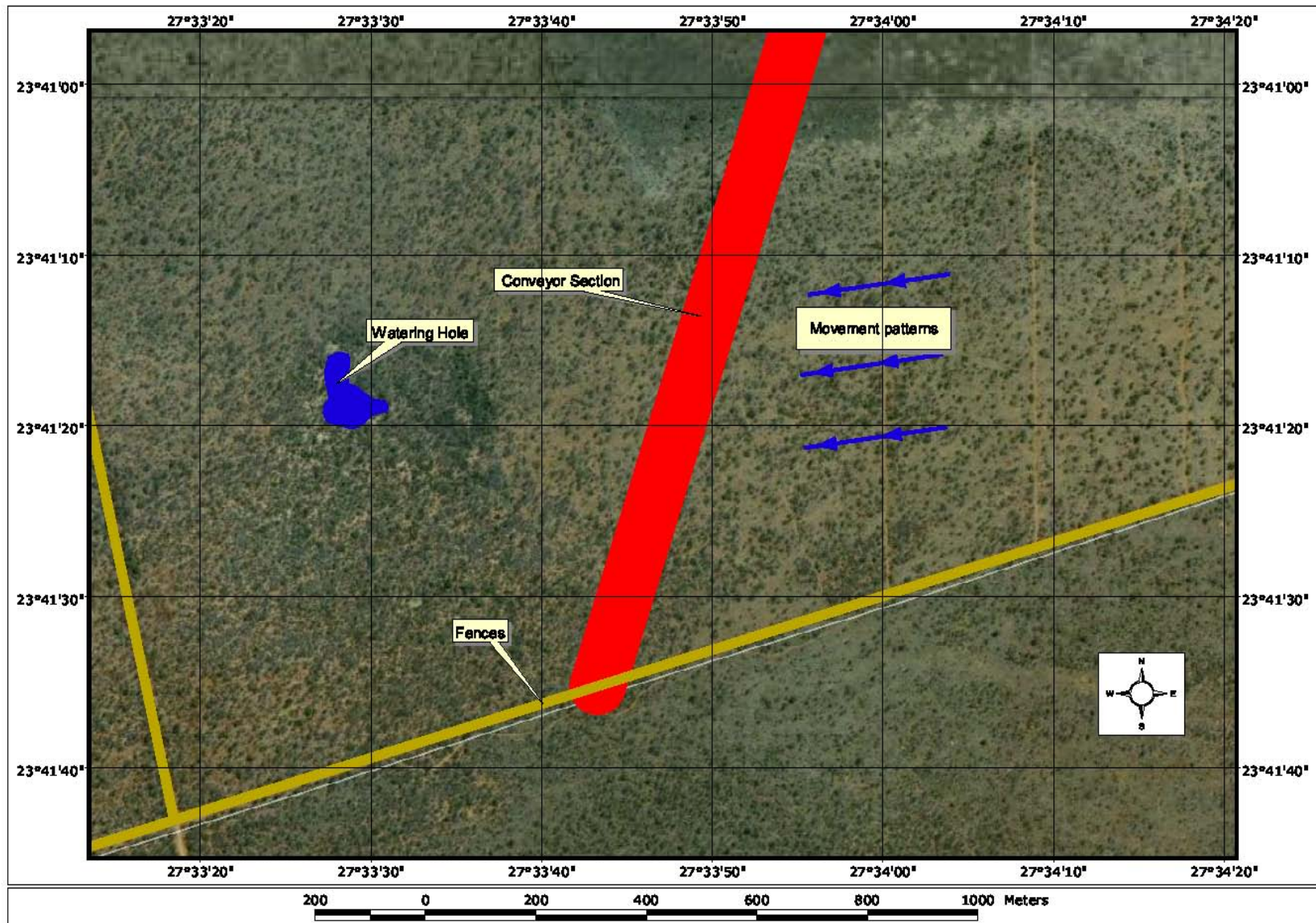
Figure 7: Faunal movement restrictions in the area

10   ECOLOGICAL INTERPRETATION

Respective results of the floristic and faunal sensitivity analysis are combined to present an overview of the ecological sensitivity of the study area.

In order to present the reader with an indication of the ecological sensitivity of the respective communities, the highest sensitivity for each ecological unit is selected as being representative of the ecological sensitivity of the specific ecological unit. Results are determined in Table 14 and visually presented in Figure 7.

Table 14: Ecological Sensitivity of the study area			
Community	Floristic Sensitivity	Faunal Sensitivity	Ecological Sensitivity
Acacia - *Eragrostis stipitata* veld	Medium	Medium	Medium
Closed *Acacia erioloba* woodland	High	Medium-high	High
Flaveria bidentis alluvial plain	Medium-High	High	High
Mixed Acacia Veld	Medium	Medium	Medium
Transformed Habitat	Low	Low	Low

Combined results from the floristic and faunal sensitivity analysis indicate the high sensitivity of the alluvial plains and closed woodland area. These areas represent slightly atypical habitat within a region of homogenous woodland. Because of the slightly different habitat characteristics of these areas, the biodiversity will be dissimilar to that of surrounding areas. Ultimately, these parts will contribute to the local and regional biodiversity of the area. Habitat types similar to these areas are not known to occur regularly in the general region. Impacts affecting the status and nature of these areas are therefore regarded significant on a local scale.

The largest extent of the study area exhibit low and medium-low ecological attributes; the proposed activity is not expected to result in significant impacts in these areas.
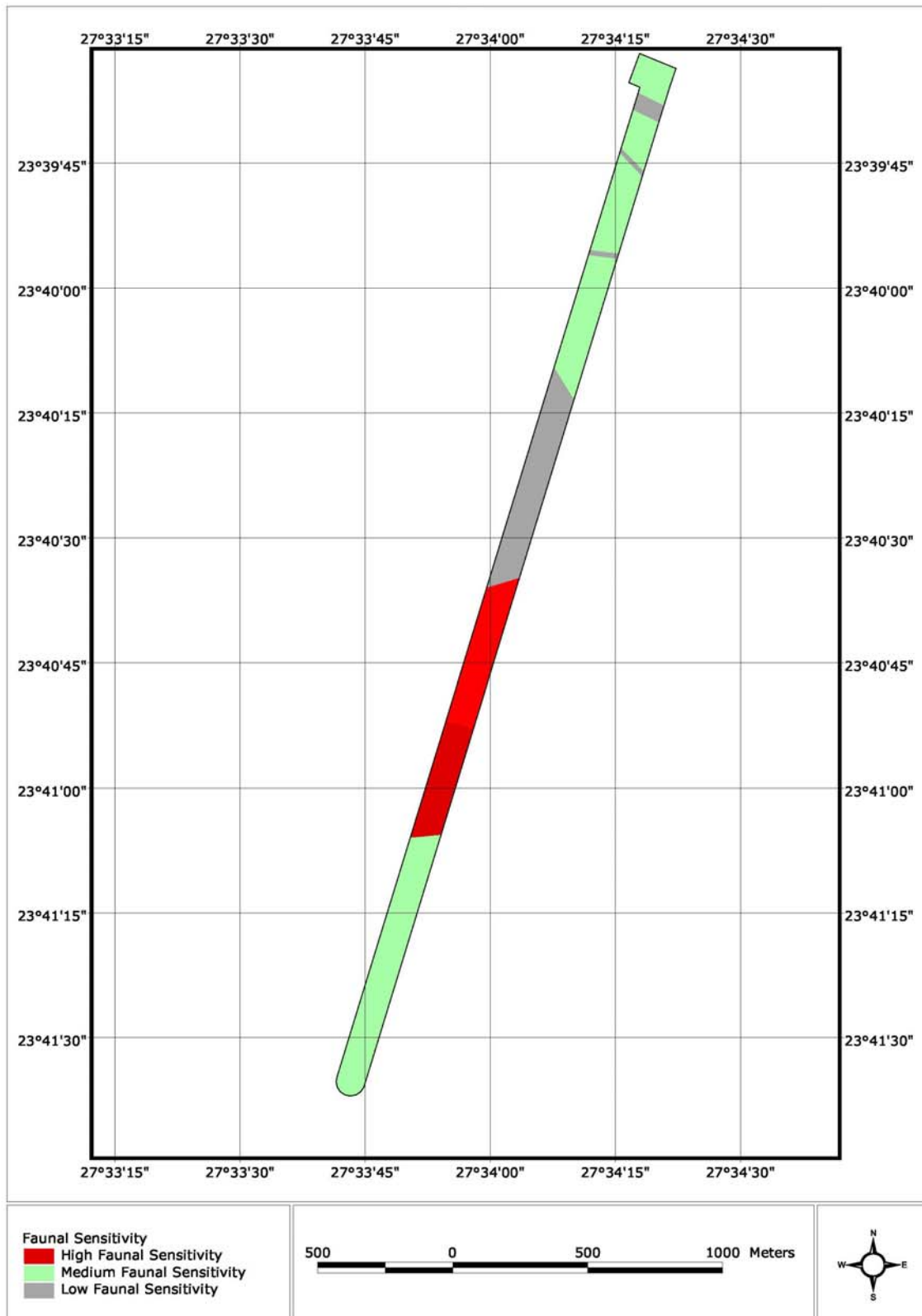
Figure 8: Ecological sensitivity of the study area

11   BIODIVERSITY IMPACT ASSESSMENT   P 58

Results of the floristic and faunal investigations were incorporated in order to present an overview of the impacts on the ecological environment. Results of this assessment indicate the low ecological sensitivity of the Transformed Habitat Type. The likelihood that sensitive biological attributes might be present in these areas is considered extremely low and the likely impacts resulting from the proposed development on biological attributes within these areas are considered insignificant. These areas are therefore excluded from the impact assessment. The implementation of generic mitigation measures are considered sufficient in limiting/ preventing any potentially significant impacts.

Results of the ecological assessment indicate the medium or higher ecological sensitivities of remaining parts of the study area. Likely impacts resulting from the proposed development are likely to be significant as a result of a high probability that sensitive ecological attributes will be affected in an adverse manner. This impact assessment is therefore aimed at presenting a description of the nature, extent and significance of likely impacts in sensitive parts of the study area as well as the immediate surrounds.

It is important to note that recommendations pertaining to the original servitude (eastern alignment, Section 5) was made on the basis that the eastern alignment would have followed the existing railway line, resulting in significantly lower impacts with regards to many of the impacts discussed in following sections. It is therefore necessary not only to assess the nature and extent of these impacts in an isolated environment, but also in comparison to the nature and extent of potential impacts from the eastern alignment.

11.1   Nature of Impacts

No impacts were identified that could lead to any beneficial impact on the ecological environment of the study area since the proposed development is largely destructive.

Direct impacts, such as habitat destruction and modifications, are regarded immediate, long-term and of high significance. These impacts are mostly measurable and fairly easy to assess as the effects thereof is immediately visible and can be determined to an acceptable level of certainty. In contrast, the effect of indirect impacts is not immediately evident and can consequently not be measured immediately. A measure of estimation is therefore necessary in order to evaluate these impacts. Lastly, impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities.

- Ten impacts were identified and placed in three categories in which they will be assessed, namely:
- **Direct impacts**:
  o Destruction of threatened flora species;
  o Destruction of protected tree species;
  o Direct impacts on threatened fauna species;
  o Direct impacts on common fauna species; and
  o Destruction of sensitive/ pristine regional habitat types;
- **Indirect Impacts**:
  o Floristic species changes within the servitudes;
  o Faunal interactions with structures, servitudes and personnel; and
  o Impacts on surrounding habitat/ species;
- **Cumulative Impacts**:
  o Increase in local and regional fragmentation/ isolation of habitat; and
  o Increase in environmental degradation.

Other, more subtle impacts on biological components, such as changes in local, regional and global climate, effects of noise pollution on fauna species, increase in acid rain, ground water deterioration, etc. are impacts that cannot be quantified to an acceptable level of certainty and is mostly subjective in nature as either little literature is available on the topic or contradictory information exist.

11.2   Nature of Impacts

11.2.1 Destruction of Threatened Flora Species

This impact is a direct impact as it results in the physical damage or destruction of Red Data or Threatened species or areas that are suitable for these species, representing a significant impact on the biodiversity of a region. Threatened species, in most cases, do not contribute significantly to the biodiversity of an area in terms of sheer numbers as there are generally few of them, but a high ecological value is placed on the presence of such species in an area as they are frequently an indication of pristine habitat conditions. Conversely, the presence of pristine habitat conditions can frequently be accepted as an indication of the potential presence of species of conservation importance.

Red Data species are particularly sensitive to changes in their environment, having adapted to a narrow range of specific habitat requirements. Habitat changes, mostly a result of human interferences and activities, are one of the greatest reasons for these species having a threatened status. Surface transformation activities within habitat types that are occupied by flora species of conservation importance will definitely result in significant and permanent impacts on these species and their population dynamics. Effects of this impact are usually permanent and recovery or mitigation is generally not perceived as possible.

One of the greatest drawbacks in terms of limiting this particular impact is that extremely little information is available in terms of the presence, distribution patterns, population dynamics and habitat requirements of Red Data flora species in the study area. In order to assess this impact an approach it is therefore necessary to assess the presence/ distribution of habitats frequently associated with these species. Furthermore, by applying ecosystem conservation principles to this impact assessment and subsequent planning and development phases, resultant impacts will be limited to a large extent.

The likelihood of any Red Data flora species occurring within the proposed development areas is estimated to be low. Similarly, available habitat within the proposed servitude is not regarded particularly suitable for any Red Data flora species. The likelihood of this impact occurring is therefore regarded low and will therefore not be evaluated in the Impact Assessment.

11.2.2 Destruction of Protected Tree Species

Tree species included in the National List of Declared Protected trees (as promulgated by the National Forests Act, 1998 (No 84 of 1998)) are present throughout the study area and impacts will be unavoidable, stemming from physical habitat disturbance. As a result of the distribution patterns of most of these species and their abundance in the study area, the level of impact on these species (in terms of conservation status) is not as severe as in the case of Red Data flora species. However, localised areas were identified that constitute important stands of certain species and the significance of impacts are likely to be high in these particular areas.

The prominence and presence of two protected tree species were confirmed during the site investigation. Available habitat is furthermore highly suitable for another species. This impact is therefore included in the Impact Assessment.

11.2.3 Direct Impacts on Threatened Fauna Species

Direct threats to threatened fauna species is regarded low in probability, mainly as a result of the ability of fauna species to migrate away from areas where impacts occur. Probably the only exception to this statement will be in the event where extremely localised habitat that are occupied by threatened fauna species are impacted by construction and operational activities to the extent that the habitat no longer satisfy the habitat requirements of the particular species, or where an increase in the isolation and fragmentation factors renders the remaining habitat inadequate. It should also be noted that most of the threatened fauna species potentially occurring in the study area have relatively wide habitat preferences and ample suitable habitat is presently available throughout the study area. To place this aspect into context it is estimated that habitat loss and transformation resulting from non-invasive and often overlooked impacts, such as overgrazing, infestation by

invasive shrubs and selective hunting probably are likely to contribute more to impacts on most threatened fauna species than this type of linear development.

No Threatened fauna species were observed within the proposed servitude during the site survey. Habitat within the proposed servitude is however regarded suitable for the presence of several Red Data fauna species and this impact is therefore included in the Impact Assessment.

11.2.4 Direct Impacts on Common Fauna Species

The likelihood of this impact being significant is relatively low as a result of the ability of animal species to migrate away from direct impacts. The tolerance levels of common animal species occurring in the study area is of such a nature that surrounding areas will suffice in habitat requirements of species forced to move from areas of impact. It is also unlikely that the conservation status of common animal species will be affected as a result of direct and indirect impacts of powerlines on these species and their habitat. However, as a result of the linear nature of the development and the location of a waterhole area directly to the west of the line, a possibility exists that the movement patterns of species might be affected.

The fairly limited nature of the development is not expected to result in any direct impacts on fauna species as animals are able to evacuate areas that become suboptimal as a result of high disturbance levels. This impact is therefore omitted from the Impact Assessment.

11.2.5 Destruction of Sensitive/ Pristine Regional Habitat Types

The loss of pristine natural regional habitat (primary vegetation) represents loss of habitat and biodiversity on a regional scale. Sensitive habitat types include mountains, ridges, koppies, wetlands, rivers, streams and localised habitat types of significant physiognomic variation and unique species composition. These areas represent centres of atypical habitat and contain biological attributes that are not frequently encountered in the greater surrounds. A high conservation value is attributed to the floristic communities and faunal assemblages of these areas as they contribute significantly to the biodiversity of a region.

Furthermore, these habitat types are generally isolated and are frequently linear in nature, such as rivers and ridges. Any impact that disrupts this continuous linear nature will risk fragmentation and isolation of existing ecological units, affecting the migration potential of some fauna species adversely, pollinator species in particular.

The importance of regional habitat types is based on the conservation status ascribed to vegetation types. Woodland areas are generally affected in a significant manner by this type of linear development and the structure and species composition is altered severely as

a result of servitude clearance. Micro-habitat conditions are changed as a result of the removal of the woody layer, affecting shade conditions, habitat competition, germination success of the herbaceous layer, etc. The removal of the dominant shrub canopy is likely to result in the establishment of a species composition that is entirely different than original conditions and the immediate surrounds, in many cases also comprising species of an invasive nature, particularly shrubs.

Although vegetation within the proposed servitude is regarded representative of the regional vegetation type, the conservation status is Least Concern. The likelihood of this impact occurring is therefore regarded low and will therefore not be assessed.

11.2.6 Floristic Species Changes within the Servitudes

This impact is regarded an indirect impact. The transformation of particularly woodland habitat during the construction process will inevitably result in the establishment of habitat types that are not considered representative of the region. As a result of the severity of habitat manipulation, servitudes are frequently invaded by species not normally associated with the region (exotic and invasive species). In addition, many species that are not necessarily abundant in the region will increase in abundance as a result of more favourable habitat conditions being created as a result of habitat manipulation activities (encroacher species). This effect is more pronounced in the floristic component, but changed habitat conditions in the servitude will inevitably imply changes in the faunal component that occupies the habitat, *albeit* on local scale.

If left unmitigated, this risk will result in decreased habitat, increased competition and lower numbers of endemic biota, the genetic pool of species might eventually be influenced by the introduction of non-endemic species. Different faunal assemblages and plant communities have developed separate gene structures as a result of habitat selection and geographical separation and the introduction of individuals of the same species that might be genetically dissimilar to the endemic species might lead to different genetic selection structures, eventually affecting the genetic structure of current populations and assemblages.

Clearance of the servitude for construction purposes will result in the establishment of a vegetation that is likely to comprise several weeds and invasive woody species, which could potentially affect surrounding areas adversely. This impact is therefore included in the Impact Assessment.

11.2.7 Faunal Interactions with Structures, Servitudes & Personnel

It should be noted that animals generally avoid contact with human structures, but do grow accustomed to structures after a period. While the structures are usually visible as a result of clearance around tower footprints, injuries and death of animals do occur sporadically as a result of accidental contact. Large mammals are mostly prone to this type of impact. In particular, primate species such as baboons and monkeys are known to climb pole and fence structures. Continuous movement of the conveyor furthermore implies a constant threat to animal species that might become trapped or entangled.

The presence of personnel within the servitude during construction and operational periods will inevitably result in some contact with animals. While most of the larger animal species are likely to move away from human contact, dangerous encounters with snakes, scorpions and possibly larger predators always remain a possibility. Similarly, the presence of humans within areas of natural habitat could potentially result in killing of animals by means of snaring, poaching, road kills, poisoning, trapping, etc.

The linear nature of the proposed development is expected to result in indirect impacts on the movement patterns of fauna species. In addition, direct interaction of fauna species with the infrastructure is likely to occur. This impact is therefore included in the Impact Assessment.

11.2.8 Impacts on Surrounding Habitat/ Species

Surrounding areas and species present in the direct vicinity of the study area could be affected by indirect impacts resulting from construction and operation activities. This indirect impact could potentially include all of the above impacts, depending on the sensitivity and status of surrounding habitat and species as well as the extent of impact activities.

The indirect nature of this impact dictates that potential impacts spreading from the proposed development into bordering areas is likely to affect natural habitat adversely. This impact is relevant and is therefore included in the Impact Assessment.

11.2.9 Increase in Local & Regional Fragmentation/ Isolation of Habitat

Uninterrupted habitat is a precious commodity for in modern times, particularly in areas that are characterised by moderate and high levels of transformation. The loss of natural habitat, even small areas, implies that biological attributes have permanently lost that ability of occupying that space, effectively meaning that a higher premium is placed on available food, water and habitat resources in the immediate surrounds. This, in some instances might mean that the viable population of plants or animals in a region will

decrease proportionally with the loss of habitat, eventually decreasing beyond a viable population size.

The danger in this type of cumulative impact is that effects are not known, or is not visible; with immediate effect and normally when these effects become visible they are beyond repair. Linear types of developments affect the migratory success of animals in particular.

Habitat fragmentation and isolation are generally not increased significantly when linear developments are placed adjacent to existing lines of transformation, such as roads or railways. In contrast, linear developments within areas of previously unfragmented habitat will result in significant cumulative habitat fragmentation and isolation impacts.

Although the general region is characterised by relatively low levels of transformation, this proposed development forms part of a series of impacts on remaining natural habitat in the region. Cumulative effects of habitat transformation are regarded relevant and this impact is therefore included in the Impact Assessment.

11.2.10   Increase in Environmental Degradation

Cumulative impacts associated with this type of development will lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water present within available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale. In most cases are these effects are not bound and is dispersed, or diluted over an area that is much larger than the actual footprint of the causal factor.

Similarly, developments in untransformed and pristine areas are usually not characterised by severe environmental degradation of the general surrounds; these impacts are usually most prevalent in areas where continuous and long-term impacts have been experienced.

The nature of the development (transport of coal within a natural environment) dictates that spillages will affect remaining natural habitat adversely. This impact is regarded relevant and is therefore included in the Impact Assessment.

11.3   Mitigation of Impacts

Mitigation measures should include the exclusion of sensitive areas from the proposed development and the implementation of generic mitigation measures to prevent surface disturbances during the construction phase. These areas should ideally be included in the development as natural open spaces while additional areas should be included as corridors for the movement of biota between areas of sensitivity.

11.4.3 Floristic Species Changes within the Servitudes

Nature	Floristic Species Changes within the Servitudes	
	Without Mitigation	With Mitigation
Extent	1 (Site & Surrounds)	1 (Site & Surrounds)
Duration	4 (Long term)	2 (Short term)
Magnitude	3 (Moderate)	2 (Low)
Reversibility	3 (Recoverable)	3 (Recoverable)
Consequence	11	8
Probability	4 (High probability)	3 (Medium probability)
Significance	**44 (Moderate)**	**24 (Low)**
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ high	
Mitigation	Implementation of monitoring programme, maintenance, prevention of infestation	
Cumulative Impacts	Limited impact on status of regional vegetation	
Residual Impacts	Transformation of natural habitat	

11.4.4 Faunal Interactions with Structures, Servitudes & Personnel

Nature	Faunal Interactions with Structures, Servitudes & Personnel	
	Without Mitigation	With Mitigation
Extent	1 (Site & Surrounds)	1 (Site & Surrounds)
Duration	4 (Long term)	4 (Long term)
Magnitude	4 (High)	3 (Moderate)
Reversibility	3 (Recoverable)	3 (Recoverable)
Consequence	12	11
Probability	5 (Definite)	3 (Medium probability)
Significance	**60 (High)**	**33 (Moderate)**
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Allowance for adequate movement for animals	
Cumulative Impacts	Habitat isolation & fragmentation	
Residual Impacts	Transformation of natural habitat	

11.4.5 Impacts on Surrounding Habitat/ Species

Nature	Impacts on Surrounding Habitat/ Species	
	Without Mitigation	With Mitigation
Extent	1 (Site & Surrounds)	1 (Site & Surrounds)
Duration	4 (Long term)	4 (Long term)
Magnitude	3 (Moderate)	2 (Low)
Reversibility	3 (Recoverable)	3 (Recoverable)
Consequence	11	10
Probability	3 (Medium probability)	2 (Low probability)

Significance	33 (Moderate)	20 (Low)
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Implementation of monitoring programme, maintenance, prevent spread of impacts	
Cumulative Impacts	Limited impact on regional vegetation type	
Residual Impacts	Transformation of natural habitat	

11.4.6 Increase in Local & Regional Fragmentation/ Isolation of Habitat

Nature	Increase in Local & Regional Fragmentation/ Isolation of Habitat	
	Without Mitigation	With Mitigation
Extent	2 (Local/ Municipal)	2 (Local/ Municipal)
Duration	4 (Long term)	4 (Long term)
Magnitude	3 (Moderate)	2 (Low)
Reversibility	3 (Recoverable)	3 (Recoverable)
Consequence	12	11
Probability	5 (Definite)	3 (Medium probability)
Significance	60 (High)	33 (Moderate)
Status	Negative	Negative
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Detailed rehabilitation after cessation of impact, implementation of monitoring programme, maintenance, prevent spread of impacts	
Cumulative Impacts	Increase in regional fragmentation & isolation of natural habitat	
Residual Impacts	Transformation of natural habitat	

11.4.7 Increase in Environmental Degradation

Nature	Increase in Environmental Degradation	
	Without Mitigation	With Mitigation
Extent	1 (Site & Surrounds)	1 (Site & Surrounds)
Duration	4 (Long term)	4 (Long term)
Magnitude	2 (Low)	2 (Low)
Reversibility	3 (Recoverable)	3 (Recoverable)
Consequence	10	10
Probability	5 (Definite)	3 (Medium probability)
Significance	50 (Moderate)	30 (Moderate)
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Implementation of monitoring programme, maintenance, prevent spread of impacts	
Cumulative Impacts	Cumulative increase of degradation, in association with other development in region	
Residual Impacts	Localised areas of degradation/ transformation	

11.5   Summary of Impacts

Table 15: Summary of impacts		
Impact	Pre Mitigation	Post Mitigation
Destruction of Protected Tree Species	85	52
Direct Impacts on Threatened Fauna Species	30	13
Floristic Species Changes within the Servitudes	44	24
Faunal Interactions with Structures, Servitudes & Personnel	60	33
Impacts on Surrounding Habitat/ Species	33	20
Increase in Local & Regional Fragmentation/ Isolation of Habitat	60	33
Increase in Environmental Degradation	50	30

11.6   Discussion

The significance of impacts associated with the proposed development on sensitive biodiversity attributes within the servitude is regarded high as a result of the destructive nature of the development. Although the extent of the impact is relatively localised and small in extent, and relative insignificant when compared to other nearby developments, the cumulative effect of habitat loss is regarded significant. Impacts on protected tree species are regarded significant, particularly since an exceptionally high density is present within one of the ecological habitat types. While this species is distributed throughout the region, this high density of individuals is regarded an important attribute. This impact can be mitigated to some extent, but the overall impact is still regarded moderately significant, to the extent that alternatives should be considered. Specific mention is made of the existing exploration road within the high sensitivity area. The use of this exploration road is strongly recommended as it represents an existing impact and will require only a slight realignment of the proposed conveyor line

Direct and indirect impacts on fauna species within the remainder of the natural environment is regarded highly significant. While it is possible to mitigate these impacts to some extent, the level of impact will still remain significant, also contributing to increasing levels of habitat loss, fragmentation and isolation.

The significance of impacts of a moderate status can effective be minimised by the implementation of generic and site specific mitigation measures. One of the important aspects in this regard is the implementation of a monitoring and maintenance programme that will prevent the spread of impacts into adjacent areas of natural habitat.

11.7   Activities Resulting in Impacts

A summation/ elaboration of expected activities are presented, based on generic procedures followed. Activities that will result in adverse impacts on the natural environment will include the following, but are not necessarily limited to:

Activity 1 -   servitude clearance, access roads - construction and operation;
Activity 2 -   surface/ soil disturbances within servitude area – construction and operation;
Activity 3 -   surface disturbances in areas used for storage space - construction;
Activity 4 -   human movement and use of surrounding areas - construction;
Activity 5 -   health and sanitation issues - construction;
Activity 6 -   occurrence of open and accidental fires - construction;
Activity 7 -   refuelling and vehicle maintenance (spillages and pollution) - construction; and
Activity 8 -   poaching/trapping/ illegal hunting – construction and operation.

11.8   Generic Mitigation Measures

Mitigation Measure 1 -   **Realign the conveyor in the western alignment to make optimal use of existing lines of degradation through sensitive environments as far as possible**;

Mitigation Measure 2 -   **Locate and mark all Protected tree species that will be affected within the final alignment. Include detailed operational procedures in the EMP for the project, which should include, but not necessarily be limited to, the removal and replanting of suitable individuals, establishing a temporary nursery for rehabilitation purposes, etc.**

Mitigation Measure 3 -   **Obtain necessary and required approval for damage/ removal/ cutting/ pruning of Protected tree species from Department of Forestry, as per National Forests Act (Act No. 84 of 1998) under Government Notice GN 1012 of 2004 and GN 767 of 2005**

Mitigation Measure 4 -   Appoint Environmental Control/ Site Officer. Appointment prior to start of construction, responsibilities should include, but not limited to ensuring adherence to EMP guidelines, guidance of activities, planning, reporting;

Mitigation Measure 5 -   Compile and implement environmental monitoring programme, the aim of which should be preventing construction related impacts, ensuring long-term success of rehabilitation and prevention of environmental degradation;

Mitigation Measure 6 -   Conduct a final walkthrough prior to commencement of construction activities. This should be the responsibility of ECO/ ecologist. Responsibilities should be ensuring absence of Red Data species from construction sites, identification of localised areas of significance;

Mitigation Measure 7 -   Identify areas that will be suitable for access roads, ensuring proper upgrade/ construction/ maintenance in order to limit erosion, proliferation of weeds, etc.;

Mitigation Measure 8 - Limit construction, maintenance and inspection activities to dry periods in order to curb occurrence/ augmentation of erosion in areas of existing erosion, destabilizing of substrate in wetlands/ riparian zones, etc;

Mitigation Measure 9 - Demarcate construction areas in order to control movement of personnel, vehicles, providing boundaries for construction sites in order to limit dilution or spread of peripheral impacts;

Mitigation Measure 10 - Remove and store topsoil separately in areas where excavation/ degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate regrowth of species that occur naturally in the area;

Mitigation Measure 11 - Compile an education programme for all contractors and subcontractors/ workers to ensure compliance to all aspects of EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat;

Mitigation Measure 12 - Prevent open fires, provide demarcated fire-safe zones, facilities and fire control measures;

Mitigation Measure 13 - Provide wildlife crossing zones for all fauna likely to occur in the area. Free movement across the conveyor from east to west and vice versa should be facilitated;

Mitigation Measure 14 - Ensure off site storage of hazardous materials, chemicals, fuels, oils, etc. in order to prevent accidental spillage, contamination or pollution;

Mitigation Measure 15 - Provide temporary on-site sanitation, litter and waste management and hazardous materials management facilities;

Mitigation Measure 16 - Ensuring surface restoration and resloping in order to prevent erosion, taking cognisance of local contours and landscaping;

Mitigation Measure 17 - Rehabilitation of disturbed areas subsequent to construction activities, taking cognisance of factors such as topsoil replacement, removal of introduced materials, local environmental factors;

Mitigation Measure 18 - Removal of dismantled structures, rubble, litter, refuse, temporary infrastructures, sanitation equipment, etc. subsequent to construction and rehabilitation;

Mitigation Measure 19 - Final inspection in order to ensure adherence to EMP guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc.; and

Mitigation Measure 20 - Conduct frequent fence patrols in order to remove snares.

11.9   Site Specific Mitigation Measures

The following site/ action specific mitigation measures are recommended:

Mitigation Measure 21 - Consider the level of land in the *Flaveria bidentis* alluvial plain in order to allow adequate movement of water during intermittent

	periods of water flow. The level of the conveyor should be raised in order to allow for the construction of ducts underneath.
Mitigation Measure 22 -	Maintenance roads within the *Flaveria bidentis* alluvial plain should consider intermittently wet periods and should be constructed in such a was as not to impact on the soil substrate or the water flow;
Mitigation Measure 23 -	Install anti-climb devices in order to prevent primates gaining access to tower structures;
Mitigation Measure 24 -	Ensure proper substrate anchorage, provide 'dummy pole' in order to prevent damage/ injury of mammals as a result of direct contact with pole structures, particularly large mammals;
Mitigation Measure 25 -	Prevent impacts on any surface water as a result of hazardous materials, contamination, unnecessary crossing by vehicles or personnel, extraction, drinking or other human uses, construction and maintenance activities; and
Mitigation Measure 26 -	Remove invasive and alien vegetation, particularly in vicinity of riparian zones where alien and invasive trees are known to occur. The implementation of a monitoring programme in this regard is recommended, being the responsibility of the ECO/ ecologist.

12   PHOTOGRAPHIC RECORDS   P 72

Photo 1: Example of Mixed Acacia veld, note abundance of weeds, indicating localised degradation

Photo 2: Example of Transformed habitat

Photo 3: Example of dense *Acacia erioloba* closed woodland

Photo 4: Example of *Flaveria bidentis* alluvial plain, note abundance of weeds, darker soils

Photo 5: Example of Baboon spider burrow

Photo 6: Example of existing line of degradation (exploration road) – southern direction

Photo 7: Example of existing line of degradation (exploration road) – northern direction

13 ADDENDUM 1 – AVIFAUNAL SPECIES LIST FOR THE REGION

Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Struthio camelus	Common Ostrich	Least Threatened	low
Tachybaptus ruficollis	Little Grebe	Least Threatened	low
Pelecanus rufescens	Pink-backed Pelican	Vulnerable	low
Phalacrocorax lucidus	White-breasted Cormorant	Least Threatened	low
Phalacrocorax africanus	Reed Cormorant	Least Threatened	low
Anhinga rufa	African Darter	Least Threatened	low
Ardea cinerea	Grey Heron	Least Threatened	low
Ardea melanocephala	Black-headed Heron	Least Threatened	low
Ardea goliath	Goliath Heron	Least Threatened	low
Ardea purpurea	Purple Heron	Least Threatened	low
Egretta alba	Great Egret	Least Threatened	low
Egretta garzetta	Little Egret	Least Threatened	low
Egretta intermedia	Yellow-billed Egret	Least Threatened	low
Egretta ardesiaca	Black Heron	Least Threatened	low
Bubulcus ibis	Cattle Egret	Least Threatened	high
Ardeola ralloides	Squacco Heron	Least Threatened	low
Butorides striatus	Green-backed Heron	Least Threatened	low
Nycticorax nycticorax	Black-crowned Night-Heron	Least Threatened	low
Gorsachius leuconotus	White-backed Night-Heron	Vulnerable	low
Ixobrychus minutus	Little Bittern	Least Threatened	low
Ixobrychus sturmii	Dwarf Bittern	Least Threatened	low
Scopus umbretta	Hamerkop	Least Threatened	moderate-low
Ciconia ciconia	White Stork	Least Threatened	moderate-low
Ciconia nigra	Black Stork	Near Threatened	low
Ciconia abdimii	Abdim's Stork	Least Threatened	moderate-low
Ephippiorhynchus senegalensis	Saddle-billed Stork	Endangered	low
Leptoptilos crumeniferus	Marabou Stork	Near Threatened	moderate-high
Mycteria ibis	Yellow-billed Stork	Near Threatened	low
Threskiornis aethiopicus	African Sacred Ibis	Least Threatened	low
Plegadis falcinellus	Glossy Ibis	Least Threatened	low
Bostrychia hagedash	Hadeda Ibis	Least Threatened	moderate-high
Platalea alba	African Spoonbill	Least Threatened	low
Phoenicopterus ruber	Greater Flamingo	Near Threatened	low
Phoenicopterus minor	Lesser Flamingo	Near Threatened	low
Dendrocygna viduata	White-faced Duck	Least Threatened	low
Dendrocygna bicolor	Fulvous Duck	Least Threatened	low
Thalassornis leuconotus	White-backed Duck	Least Threatened	low
Alopochen aegyptiacus	Egyptian Goose	Least Threatened	moderate
Anas undulata	Yellow-billed Duck	Least Threatened	low
Anas sparsa	African Black Duck	Least Threatened	low
Anas capensis	Cape Teal	Least Threatened	low
Anas hottentota	Hottentot Teal	Least Threatened	low
Anas erythrorhyncha	Red-billed Teal	Least Threatened	low
Anas smithii	Cape Shoveler	Least Threatened	low
Netta erythrophthalma	Southern Pochard	Least Threatened	low
Sarkidiornis melanotos	Comb Duck	Least Threatened	low

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Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Plectropterus gambensis	Spur-winged Goose	Least Threatened	low
Oxyura maccoa	Maccoa Duck	Least Threatened	low
Sagittarius serpentarius	Secretarybird	Near Threatened	moderate
Gyps coprotheres	Cape Vulture	Vulnerable	moderate-low
Gyps africanus	White-backed Vulture	Vulnerable	moderate
Torgos tracheliotus	Lappet-faced Vulture	Vulnerable	moderate
Trigonoceps occipitalis	White-headed Vulture	Vulnerable	moderate-low
Milvus migrans	Black Kite	Least Threatened	moderate
Milvus aegyptius	Yellow-billed Kite	Least Threatened	moderate
Elanus caeruleus	Black-shouldered Kite	Least Threatened	high
Pernis apivorus	European Honey-Buzzard	Least Threatened	moderate-low
Aquila verreauxii	Verreaux's Eagle	Least Threatened	moderate-low
Aquila rapax	Tawny Eagle	Vulnerable	moderate
Aquila nipalensis	Steppe Eagle	Least Threatened	moderate-low
Aquila pomarina	Lesser Spotted Eagle	Least Threatened	moderate-low
Aquila wahlbergi	Wahlberg's Eagle	Least Threatened	moderate-low
Hieraaetus pennatus	Booted Eagle	Least Threatened	moderate-low
Hieraaetus spilogaster	African Hawk-Eagle	Least Threatened	moderate-low
Hieraaetus ayresii	Ayres's Hawk-Eagle	Near Threatened	low
Polemaetus bellicosus	Martial Eagle	Vulnerable	moderate-high
Circaetus cinereus	Brown Snake-Eagle	Least Threatened	moderate
Circaetus pectoralis	Black-chested Snake-Eagle	Least Threatened	high
Terathopius ecaudatus	Bateleur	Vulnerable	moderate
Haliaeetus vocifer	African Fish-Eagle	Least Threatened	moderate-low
Buteo vulpinus	Steppe Buzzard	Least Threatened	moderate-low
Buteo rufofuscus	Jackal Buzzard	Least Threatened	moderate-low
Kaupifalco monogrammicus	Lizard Buzzard	Least Threatened	moderate
Accipiter ovampensis	Ovambo Sparrowhawk	Least Threatened	moderate-low
Accipiter minullus	Little Sparrowhawk	Least Threatened	moderate
Accipiter melanoleucus	Black Sparrowhawk	Least Threatened	moderate-low
Accipiter badius	Shikra	Least Threatened	moderate
Accipiter tachiro	African Goshawk	Least Threatened	moderate-low
Melierax gabar	Gabar Goshawk	Least Threatened	moderate
Melierax canorus	Southern Pale Chanting Goshawk	Least Threatened	moderate-high
Circus aeruginosus	Western Marsh-Harrier	Least Threatened	low
Circus pygargus	Montagu's Harrier	Least Threatened	moderate-low
Circus macrourus	Pallid Harrier	Near Threatened	moderate-low
Polyboroides typus	African Harrier-Hawk	Least Threatened	moderate
Pandion haliaetus	Osprey	Least Threatened	low
Falco peregrinus	Peregrine Falcon	Near Threatened	low
Falco biarmicus	Lanner Falcon	Near Threatened	moderate
Falco subbuteo	Eurasian Hobby	Least Threatened	moderate-low
Falco vespertinus	Red-footed Falcon	Near Threatened	moderate-low
Falco amurensis	Amur Falcon	Least Threatened	moderate-low
Falco rupicolis	Rock Kestrel	Least Threatened	confirmed
Falco rupicoloides	Greater Kestrel	Least Threatened	high
Falco naumanni	Lesser Kestrel	Vulnerable	moderate-low
Peliperdix coqui	Coqui Francolin	Least Threatened	high

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Species Details			Result
Biological Name	English Name	Status	Probability
Dendroperdix sephaena	Crested Francolin	Least Threatened	high
Pternistis natalensis	Natal Francolin	Least Threatened	high
Pternistis swainsonii	Swainson's Spurfowl	Least Threatened	confirmed
Coturnix coturnix	Common Quail	Least Threatened	moderate
Coturnix delegorguei	Harlequin Quail	Least Threatened	moderate-high
Numida meleagris	Helmeted Guineafowl	Least Threatened	confirmed
Turnix sylvatica	Small Buttonquail	Least Threatened	moderate-low
Crecopsis egregia	African Crake	Least Threatened	low
Amaurornis flavirostris	Black Crake	Least Threatened	low
Porzana porzana	Spotted Crake	Least Threatened	low
Gallinula chloropus	Common Moorhen	Least Threatened	low
Gallinula angulata	Lesser Moorhen	Least Threatened	low
Fulica cristata	Red-knobbed Coot	Least Threatened	low
Podica senegalensis	African Finfoot	Vulnerable	low
Ardeotis kori	Kori Bustard	Vulnerable	moderate
Eupodotis ruficrista	Red-crested Korhaan	Least Threatened	moderate
Eupodotis afraoides	Northern Black Korhaan	Least Threatened	moderate-low
Actophilornis africanus	African Jacana	Least Threatened	low
Rostratula benghalensis	Greater Painted-snipe	Near Threatened	low
Charadrius hiaticula	Common Ringed Plover	Least Threatened	low
Charadrius pecuarius	Kittlitz's Plover	Least Threatened	low
Charadrius tricollaris	Three-banded Plover	Least Threatened	low
Charadrius asiaticus	Caspian Plover	Least Threatened	low
Vanellus coronatus	Crowned Lapwing	Least Threatened	high
Vanellus armatus	Blacksmith Lapwing	Least Threatened	low
Vanellus albiceps	White-crowned Lapwing	Near Threatened	low
Vanellus senegallus	African Wattled Lapwing	Least Threatened	low
Arenaria interpres	Ruddy Turnstone	Least Threatened	low
Actitis hypoleucos	Common Sandpiper	Least Threatened	low
Tringa ochropus	Green Sandpiper	Least Threatened	low
Tringa glareola	Wood Sandpiper	Least Threatened	low
Tringa stagnatilis	Marsh Sandpiper	Least Threatened	low
Tringa nebularia	Common Greenshank	Least Threatened	low
Calidris ferruginea	Curlew Sandpiper	Least Threatened	low
Calidris minuta	Little Stint	Least Threatened	low
Calidris alba	Sanderling	Least Threatened	low
Philomachus pugnax	Ruff	Least Threatened	low
Gallinago nigripennis	African Snipe	Least Threatened	low
Numenius phaeopus	Common Whimbrel	Least Threatened	low
Recurvirostra avosetta	Pied Avocet	Least Threatened	low
Himantopus himantopus	Black-winged Stilt	Least Threatened	low
Burhinus capensis	Spotted Thick-knee	Least Threatened	moderate
Burhinus vermiculatus	Water Thick-knee	Least Threatened	low
Cursorius temminckii	Temminck's Courser	Least Threatened	moderate
Rhinoptilus cinctus	Three-banded Courser	Least Threatened	moderate-low
Rhinoptilus chalcopterus	Bronze-winged Courser	Least Threatened	moderate
Glareola nordmanni	Black-winged Pratincole	Near Threatened	low
Larus cirrocephalus	Grey-headed Gull	Least Threatened	low

Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Chlidonias hybridus	Whiskered Tern	Least Threatened	low
Chlidonias leucopterus	White-winged Tern	Least Threatened	low
Pterocles burchelli	Burchell's Sandgrouse	Least Threatened	moderate-low
Pterocles bicinctus	Double-banded Sandgrouse	Least Threatened	moderate-low
Columba livia	Rock Dove	Least Threatened	high
Columba guinea	Speckled Pigeon	Least Threatened	high
Streptopelia semitorquata	Red-eyed Dove	Least Threatened	high
Streptopelia capicola	Cape Turtle-Dove	Least Threatened	confirmed
Streptopelia senegalensis	Laughing Dove	Least Threatened	confirmed
Oena capensis	Namaqua Dove	Least Threatened	high
Turtur chalcospilos	Emerald-spotted Wood-Dove	Least Threatened	high
Treron calva	African Green-Pigeon	Least Threatened	moderate-low
Poicephalus meyeri	Meyer's Parrot	Least Threatened	moderate
Corythaixoides concolor	Grey Go-away-bird	Least Threatened	confirmed
Cuculus canorus	Common Cuckoo	Least Threatened	moderate-low
Cuculus gularis	African Cuckoo	Least Threatened	moderate
Cuculus solitarius	Red-chested Cuckoo	Least Threatened	moderate-high
Cuculus clamosus	Black Cuckoo	Least Threatened	moderate-high
Clamator glandarius	Great Spotted Cuckoo	Least Threatened	moderate-high
Clamator levaillantii	Levaillant's Cuckoo	Least Threatened	moderate-high
Clamator jacobinus	Jacobin Cuckoo	Least Threatened	moderate-high
Chrysococcyx klaas	Klaas's Cuckoo	Least Threatened	moderate-high
Chrysococcyx caprius	Diderick Cuckoo	Least Threatened	high
Centropus burchellii	Burchell's Coucal	Least Threatened	moderate-low
Tyto alba	Barn Owl	Least Threatened	moderate-high
Asio capensis	Marsh Owl	Least Threatened	low
Otus senegalensis	African Scops-Owl	Least Threatened	high
Ptilopsus granti	Southern White-faced Scops-Owl	Least Threatened	high
Glaucidium perlatum	Pearl-spotted Owlet	Least Threatened	high
Bubo africanus	Spotted Eagle-Owl	Least Threatened	moderate-high
Bubo lacteus	Verreaux's Eagle-Owl	Least Threatened	moderate
Caprimulgus europaeus	European Nightjar	Least Threatened	high
Caprimulgus pectoralis	Fiery-necked Nightjar	Least Threatened	high
Caprimulgus rufigena	Rufous-cheeked Nightjar	Least Threatened	high
Caprimulgus tristigma	Freckled Nightjar	Least Threatened	moderate-low
Apus apus	Common Swift	Least Threatened	high
Apus barbatus	African Black Swift	Least Threatened	moderate
Apus caffer	White-rumped Swift	Least Threatened	moderate-high
Apus horus	Horus Swift	Least Threatened	moderate
Apus affinis	Little Swift	Least Threatened	high
Tachymarptis melba	Alpine Swift	Least Threatened	moderate-low
Cypsiurus parvus	African Palm-Swift	Least Threatened	low
Colius striatus	Speckled Mousebird	Least Threatened	high
Colius colius	White-backed Mousebird	Least Threatened	moderate-low
Urocolius indicus	Red-faced Mousebird	Least Threatened	confirmed
Ceryle rudis	Pied Kingfisher	Least Threatened	low
Megaceryle maxima	Giant Kingfisher	Least Threatened	low
Alcedo semitorquata	Half-collared Kingfisher	Near Threatened	low

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Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Alcedo cristata	Malachite Kingfisher	Least Threatened	low
Ispidina picta	African Pygmy-Kingfisher	Least Threatened	moderate-low
Halcyon senegalensis	Woodland Kingfisher	Least Threatened	high
Halcyon albiventris	Brown-hooded Kingfisher	Least Threatened	confirmed
Halcyon leucocephala	Grey-headed Kingfisher	Least Threatened	moderate-high
Halcyon chelicuti	Striped Kingfisher	Least Threatened	high
Merops apiaster	European Bee-eater	Least Threatened	high
Merops persicus	Blue-cheeked Bee-eater	Least Threatened	confirmed
Merops nubicoides	Southern Carmine Bee-eater	Least Threatened	moderate
Merops bullockoides	White-fronted Bee-eater	Least Threatened	moderate-low
Merops pusillus	Little Bee-eater	Least Threatened	moderate
Merops hirundineus	Swallow-tailed Bee-eater	Least Threatened	moderate
Coracias garrulus	European Roller	Least Threatened	confirmed
Coracias caudata	Lilac-breasted Roller	Least Threatened	confirmed
Coracias naevia	Purple Roller	Least Threatened	high
Eurystomus glaucurus	Broad-billed Roller	Least Threatened	low
Upupa africana	African Hoopoe	Least Threatened	moderate
Phoeniculus purpureus	Green Wood-Hoopoe	Least Threatened	confirmed
Rhinopomastus cyanomelas	Common Scimitarbill	Least Threatened	high
Tockus nasutus	African Grey Hornbill	Least Threatened	confirmed
Tockus erythrorhynchus	Red-billed Hornbill	Least Threatened	high
Tockus leucomelas	Southern Yellow-billed Hornbill	Least Threatened	confirmed
Bucorvus leadbeateri	Southern Ground-Hornbill	Vulnerable	moderate-low
Lybius torquatus	Black-collared Barbet	Least Threatened	high
Tricholaema leucomelas	Acacia Pied Barbet	Least Threatened	high
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	Least Threatened	moderate-high
Trachyphonus vaillantii	Crested Barbet	Least Threatened	high
Indicator indicator	Greater Honeyguide	Least Threatened	high
Indicator minor	Lesser Honeyguide	Least Threatened	moderate-high
Prodotiscus regulus	Brown-backed Honeybird	Least Threatened	moderate-low
Campethera bennettii	Bennett's Woodpecker	Least Threatened	high
Campethera abingoni	Golden-tailed Woodpecker	Least Threatened	high
Dendropicos fuscescens	Cardinal Woodpecker	Least Threatened	high
Dendropicos namaquus	Bearded Woodpecker	Least Threatened	high
Jynx ruficollis	Red-throated Wryneck	Least Threatened	moderate-low
Mirafra passerina	Monotonous Lark	Least Threatened	moderate-low
Mirafra africana	Rufous-naped Lark	Least Threatened	moderate
Calendulauda africanoides	Fawn-coloured Lark	Least Threatened	moderate
Calendulauda sabota	Sabota Lark	Least Threatened	moderate-low
Pinarocorys nigricans	Dusky Lark	Least Threatened	moderate-low
Calandrella cinerea	Red-capped Lark	Least Threatened	low
Spizocorys conirostris	Pink-billed Lark	Least Threatened	low
Eremopterix leucotis	Chestnut-backed Sparrowlark	Least Threatened	low
Eremopterix verticalis	Grey-backed Sparrowlark	Least Threatened	low
Hirundo rustica	Barn Swallow	Least Threatened	high
Hirundo albigularis	White-throated Swallow	Least Threatened	low
Hirundo dimidiata	Pearl-breasted Swallow	Least Threatened	high
Hirundo semirufa	Red-breasted Swallow	Least Threatened	high

Species Details			Result
Biological Name	English Name	Status	Probability
Hirundo cucullata	Greater Striped Swallow	Least Threatened	confirmed
Hirundo abyssinica	Lesser Striped Swallow	Least Threatened	high
Hirundo spilodera	South African Cliff-Swallow	Least Threatened	low
Hirundo fuligula	Rock Martin	Least Threatened	low
Delichon urbica	Common House-Martin	Least Threatened	moderate-low
Riparia riparia	Sand Martin	Least Threatened	low
Riparia paludicola	Brown-throated Martin	Least Threatened	low
Riparia cincta	Banded Martin	Least Threatened	low
Campephaga flava	Black Cuckooshrike	Least Threatened	moderate
Dicrurus adsimilis	Fork-tailed Drongo	Least Threatened	high
Oriolus oriolus	Eurasian Golden Oriole	Least Threatened	moderate
Oriolus larvatus	Black-headed Oriole	Least Threatened	high
Corvus albus	Pied Crow	Least Threatened	high
Parus cinerascens	Ashy Tit	Least Threatened	moderate-high
Parus niger	Southern Black Tit	Least Threatened	moderate-high
Anthoscopus minutus	Cape Penduline-Tit	Least Threatened	moderate-low
Anthoscopus caroli	Grey Penduline-Tit	Least Threatened	moderate-low
Turdoides jardineii	Arrow-marked Babbler	Least Threatened	confirmed
Turdoides bicolor	Southern Pied Babbler	Least Threatened	moderate-low
Pycnonotus nigricans	African Red-eyed Bulbul	Least Threatened	moderate-high
Pycnonotus tricolor	Dark-capped Bulbul	Least Threatened	high
Phyllastrephus terrestris	Terrestrial Brownbul	Least Threatened	low
Chlorocichla flaviventris	Yellow-bellied Greenbul	Least Threatened	low
Turdus libonyanus	Kurrichane Thrush	Least Threatened	moderate-high
Psophocichla litsipsirupa	Groundscraper Thrush	Least Threatened	moderate-high
Oenanthe monticola	Mountain Wheatear	Least Threatened	low
Oenanthe pileata	Capped Wheatear	Least Threatened	low
Cercomela familiaris	Familiar Chat	Least Threatened	low
Thamnolaea cinnamomeiventris	Mocking Cliff-Chat	Least Threatened	low
Myrmecocichla formicivora	Anteating Chat	Least Threatened	low
Saxicola torquata	African Stonechat	Least Threatened	low
Cossypha caffra	Cape Robin-Chat	Least Threatened	low
Cossypha humeralis	White-throated Robin-Chat	Least Threatened	low
Cercotrichas leucophrys	White-browed Scrub-Robin	Least Threatened	moderate-high
Cercotrichas paena	Kalahari Scrub-Robin	Least Threatened	moderate-low
Sylvia borin	Garden Warbler	Least Threatened	low
Sylvia communis	Common Whitethroat	Least Threatened	low
Parisoma subcaeruleum	Chestnut-vented Tit-Babbler	Least Threatened	moderate
Hippolais icterina	Icterine Warbler	Least Threatened	moderate-low
Hippolais olivetorum	Olive-tree Warbler	Least Threatened	moderate-low
Acrocephalus arundinaceus	Great Reed-Warbler	Least Threatened	low
Acrocephalus baeticatus	African Reed-Warbler	Least Threatened	low
Acrocephalus palustris	Marsh Warbler	Least Threatened	low
Acrocephalus schoenobaenus	Sedge Warbler	Least Threatened	low
Acrocephalus gracilirostris	Lesser Swamp-Warbler	Least Threatened	low
Bradypterus baboecala	Little Rush-Warbler	Least Threatened	low
Phylloscopus trochilus	Willow Warbler	Least Threatened	moderate-high
Apalis thoracica	Bar-throated Apalis	Least Threatened	low

Species Details			Result
Biological Name	English Name	Status	Probability
Sylvietta rufescens	Long-billed Crombec	Least Threatened	moderate-high
Eremomela icteropygialis	Yellow-bellied Eremomela	Least Threatened	moderate-high
Eremomela usticollis	Burnt-necked Eremomela	Least Threatened	moderate
Camaroptera brevicaudata	Grey-backed Camaroptera	Least Threatened	moderate-low
Calamonastes fasciolatus	Barred Wren-Warbler	Least Threatened	moderate-low
Cisticola juncidis	Zitting Cisticola	Least Threatened	low
Cisticola aridulus	Desert Cisticola	Least Threatened	moderate-low
Cisticola rufilatus	Tinkling Cisticola	Least Threatened	moderate-low
Cisticola chinianus	Rattling Cisticola	Least Threatened	confirmed
Cisticola erythrops	Red-faced Cisticola	Least Threatened	low
Cisticola tinniens	Levaillant's Cisticola	Least Threatened	low
Cisticola aberrans	Lazy Cisticola	Least Threatened	low
Cisticola fulvicapillus	Neddicky	Least Threatened	moderate-high
Prinia subflava	Tawny-flanked Prinia	Least Threatened	confirmed
Prinia flavicans	Black-chested Prinia	Least Threatened	moderate-high
Muscicapa striata	Spotted Flycatcher	Least Threatened	high
Muscicapa caerulescens	Ashy Flycatcher	Least Threatened	low
Myioparus plumbeus	Grey Tit-Flycatcher	Least Threatened	moderate-low
Melaenornis pammelaina	Southern Black Flycatcher	Least Threatened	moderate-high
Bradornis mariquensis	Marico Flycatcher	Least Threatened	moderate-low
Bradornis pallidus	Pale Flycatcher	Least Threatened	moderate-low
Sigelus silens	Fiscal Flycatcher	Least Threatened	moderate
Batis molitor	Chinspot Batis	Least Threatened	confirmed
Stenostira scita	Fairy Flycatcher	Least Threatened	moderate-low
Terpsiphone viridis	African Paradise-Flycatcher	Least Threatened	moderate-low
Motacilla aguimp	African Pied Wagtail	Least Threatened	low
Motacilla capensis	Cape Wagtail	Least Threatened	low
Motacilla flava	Yellow Wagtail	Least Threatened	low
Anthus cinnamomeus	African Pipit	Least Threatened	low
Anthus similis	Long-billed Pipit	Least Threatened	low
Anthus leucophrys	Plain-backed Pipit	Least Threatened	low
Anthus vaalensis	Buffy Pipit	Least Threatened	low
Anthus lineiventris	Striped Pipit	Least Threatened	low
Anthus trivialis	Tree Pipit	Least Threatened	moderate-low
Anthus caffer	Bushveld Pipit	Least Threatened	moderate-high
Lanius minor	Lesser Grey Shrike	Least Threatened	confirmed
Lanius collaris	Common Fiscal	Least Threatened	moderate-high
Lanius collurio	Red-backed Shrike	Least Threatened	moderate-high
Corvinella melanoleuca	Magpie Shrike	Least Threatened	high
Laniarius ferrugineus	Southern Boubou	Least Threatened	moderate-low
Laniarius aethiopicus	Tropical Boubou	Least Threatened	low
Laniarius atrococcineus	Crimson-breasted Shrike	Least Threatened	high
Dryoscopus cubla	Black-backed Puffback	Least Threatened	high
Nilaus afer	Brubru	Least Threatened	high
Tchagra australis	Brown-crowned Tchagra	Least Threatened	confirmed
Tchagra senegala	Black-crowned Tchagra	Least Threatened	confirmed
Telophorus sulfureopectus	Orange-breasted Bush-Shrike	Least Threatened	high
Malaconotus blanchoti	Grey-headed Bush-Shrike	Least Threatened	high

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Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Prionops plumatus	White-crested Helmet-Shrike	Least Threatened	high
Eurocephalus anguitimens	Southern White-crowned Shrike	Least Threatened	high
Creatophora cinerea	Wattled Starling	Least Threatened	moderate-low
Cinnyricinclus leucogaster	Violet-backed Starling	Least Threatened	moderate
Lamprotornis australis	Burchell's Starling	Least Threatened	moderate-high
Lamprotornis mevesii	Meves's Starling	Least Threatened	low
Lamprotornis nitens	Cape Glossy Starling	Least Threatened	high
Lamprotornis chalybaeus	Greater Blue-eared Starling	Least Threatened	moderate-high
Onychognathus morio	Red-winged Starling	Least Threatened	low
Buphagus erythrorhynchus	Red-billed Oxpecker	Near Threatened	moderate-high
Cinnyris mariquensis	Marico Sunbird	Least Threatened	high
Cinnyris talatala	White-bellied Sunbird	Least Threatened	high
Chalcomitra amethystina	Amethyst Sunbird	Least Threatened	moderate-high
Zosterops virens	Cape White-eye	Least Threatened	moderate-high
Bubalornis niger	Red-billed Buffalo-Weaver	Least Threatened	high
Plocepasser mahali	White-browed Sparrow-Weaver	Least Threatened	high
Passer domesticus	House Sparrow	Least Threatened	low
Passer motitensis	Great Sparrow	Least Threatened	moderate-low
Passer melanurus	Cape Sparrow	Least Threatened	moderate
Passer diffusus	Southern Grey-headed Sparrow	Least Threatened	high
Petronia superciliaris	Yellow-throated Petronia	Least Threatened	moderate-high
Sporopipes squamifrons	Scaly-feathered Finch	Least Threatened	moderate-low
Ploceus ocularis	Spectacled Weaver	Least Threatened	low
Ploceus cucullatus	Village Weaver	Least Threatened	moderate-low
Ploceus capensis	Cape Weaver	Least Threatened	low
Ploceus velatus	Southern Masked-Weaver	Least Threatened	moderate-low
Ploceus intermedius	Lesser Masked-Weaver	Least Threatened	moderate-low
Anaplectes rubriceps	Red-headed Weaver	Least Threatened	moderate
Anomalospiza imberbis	Cuckoo Finch	Least Threatened	low
Quelea quelea	Red-billed Quelea	Least Threatened	moderate
Euplectes orix	Southern Red Bishop	Least Threatened	moderate-low
Euplectes afer	Yellow-crowned Bishop	Least Threatened	low
Euplectes albonotatus	White-winged Widowbird	Least Threatened	low
Euplectes ardens	Red-collared Widowbird	Least Threatened	low
Pytilia melba	Green-winged Pytilia	Least Threatened	moderate-high
Lagonosticta rhodopareia	Jameson's Firefinch	Least Threatened	moderate-high
Lagonosticta senegala	Red-billed Firefinch	Least Threatened	low
Uraeginthus angolensis	Blue Waxbill	Least Threatened	confirmed
Granatina granatina	Violet-eared Waxbill	Least Threatened	moderate
Estrilda astrild	Common Waxbill	Least Threatened	low
Estrilda erythronotos	Black-faced Waxbill	Least Threatened	moderate-low
Ortygospiza atricollis	African Quailfinch	Least Threatened	low
Amandava subflava	Orange-breasted Waxbill	Least Threatened	low
Amadina fasciata	Cut-throat Finch	Least Threatened	moderate-high
Amadina erythrocephala	Red-headed Finch	Least Threatened	moderate-high
Lonchura cucullata	Bronze Mannikin	Least Threatened	moderate-low
Vidua macroura	Pin-tailed Whydah	Least Threatened	moderate-high
Vidua regia	Shaft-tailed Whydah	Least Threatened	moderate

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Species Details			Result
Biological Name	**English Name**	**Status**	**Probability**
Vidua paradisaea	Long-tailed Paradise-Whydah	Least Threatened	moderate-high
Vidua funerea	Dusky Indigobird	Least Threatened	moderate-low
Vidua purpurascens	Purple Indigobird	Least Threatened	moderate
Vidua chalybeata	Village Indigobird	Least Threatened	moderate
Serinus mozambicus	Yellow-fronted Canary	Least Threatened	moderate-low
Serinus atrogularis	Black-throated Canary	Least Threatened	moderate
Serinus flaviventris	Yellow Canary	Least Threatened	moderate
Serinus gularis	Streaky-headed Seedeater	Least Threatened	moderate-low
Emberiza flaviventris	Golden-breasted Bunting	Least Threatened	moderate
Emberiza capensis	Cape Bunting	Least Threatened	low
Emberiza tahapisi	Cinnamon-breasted Bunting	Least Threatened	low
Emberiza impetuani	Lark-like Bunting	Least Threatened	low

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