

7. FAUNA AND FLORA

This ecological scoping assessment presents broad descriptions of floristic and faunal elements within the proposed areas and highlights sensitive elements that might be adversely affected. Taking cognisance of the inherent ecological sensitivity of the various areas, recommendations are made in terms of a preferred placement of the development and any additional studies, if required. This was achieved through adopting the following approach:

- Assessment of available information pertinent to general floristic and faunal attributes of the surrounds.
- Assessment of available information pertinent to potential red data flora and fauna species.
- Conduct general/ broad surveys to assess the current status of the proposed areas.
- Evaluation of all information at a scoping level and present results in terms of:
 - * make recommendations regarding the feasibility of the project in terms of terrestrial flora and fauna.
 - * make recommendations regarding the preferred placement of the proposed development.
 - * make recommendations regarding any mitigation measures to be implemented, where applicable.
 - * identify gaps of information.
 - * make recommendations regarding any additional studies to be undertaken, if required.
- Conduct a red data probability analysis.

7.1. Methodology

7.1.1. Flora

General assessment of ecological elements does not require detailed floristic and faunal sampling and community descriptions, and is mostly based on physiognomic appearances and variations that are observed in the available habitat as well as dominant species composition. All variations are interpreted in terms of general environmental attributes and macro and local land use forms.

For the purpose of this evaluation the floristic sensitivity of proposed farms was assessed on the basis of the following attributes:

- Environmental diversity – taking cognisance of the biophysical environment, i.e. geology, land type units, topography, etc that is generally accepted to be driving forces behind vegetation development.

- Floristic diversity - assessing the vegetation on the basis of zero degradation, taking the regional vegetation into consideration.
- Red Data probability analysis – compare relevant information databases to assess the likelihood of red data flora and fauna species occurring on the respective farms.
- Types of impacts – considering the various forms of degradation resulting from the proposed development.
- Consider the presence of unique and sensitive floristic communities.

7.1.2. Fauna

For the purpose of this scoping investigation, emphasis was placed on the assessment of the diversity and status of the habitat present in the study area. In addition, availability of suitable habitat for potential Red Data fauna species, and the connectivity of these and other undisturbed, natural habitat were evaluated.

For the purpose of this evaluation the faunal sensitivity of the eight alternate proposed sites was compared in terms of the following:

- Environmental diversity – an estimation of the diversity of environmental attributes and interactions between such factors that potentially influence the animal assemblages of a site.
- Habitat diversity – an estimation of the level of habitat variation and diversity of characteristics (such as wetland or other scarce elements) within each site that are likely to influence the community structure of the area investigated.
- Habitat status – a general estimation of the average status of available habitat based on the obvious degradation of the habitat.
- Connectivity – based on the surrounding land uses and the proximity of other natural or relatively undisturbed areas with land uses compatible with the conservation of habitat, particularly with regards to potential Red Data inhabitants of the region.

7.2. Limitations to this Investigation

This scoping investigation is based on a snapshot investigation of the proposed farms and not on the detailed or long-term investigation of all environmental attributes and the varying degrees of biological diversity that may be present in the study area. Therefore, no conclusions may be drawn with regards to biological diversity or conservation strategies as far as the proposed farms are concerned as additional information may come to light during detailed assessments of the respective sites.

Because rare and endemic species do not normally occur in great densities and because of customary limitations in the search and identification of red data species, the detailed investigation of the presence of these species within the proposed farms was not perceived as within the scope of this investigation. Estimations provided in this document only provide some indication towards the probability of the occurrence of these species as the low levels of biological and distributional information inherently associated with Red Data species create large gaps in such estimations. These gaps are only lessened by intense sampling and surveying in a study area, which would be associated with full EIA-level investigations.

It is emphasised that information, as presented in this document, only has bearing on the proposed areas as indicated on the accompanying maps and cannot be applied to other areas, however similar in appearance or any other aspect, without proper investigation.

7.3. The Biophysical Environment

7.3.1. Regional Vegetation

Vegetation types, according to descriptions presented by Van Rooyen and Bredenkamp in 'The Vegetation of South Africa, Lesotho and Swaziland' (Low and Rebelo, 1998) that comprises the eight farms include Waterberg Moist Mountain Bushveld (12), Sweet Bushveld (17) and Mixed Bushveld (18), forming part of the Savanna Biome (Figure 7.1).

The Savanna Biome is the largest biome in Southern Africa, occupying over one-third of the area of South Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants. The environmental factors delimiting the biome are complex; altitude ranges from sea level to 2 000 m; rainfall varies from 235 mm to 1 000 mm per year; frost may occur and almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. The shrub layer may vary from 1 to 20 m in height, but in Bushveld typically varies from 3 to 7m. The shrub-tree element may come to dominate the vegetation in areas which are being overgrazed.

Waterberg Moist Mountain Bushveld occurs on sandstone and quartzite of the Waterberg Mountains, comprising an extremely small south eastern portion of the farm Naauwontkomen. The tree layer is dominant, consisting of a composition of *Faurea saligna*, *Acacia caffra*, *Burkea africana*, *Terminalia sericea* and *Peltophorum africanum* on deep, sandy areas, with *Kirkia acuminata*, *Englerophytum magalimontanum*, *Protea caffra*, *Croton gratissimus*, *Combretum*

apiculatum, *Alibizia tanganyikensis* and *Combretum molle* characteristic of the rocky slopes. The shrub- and grass layer is moderately to well-developed, depending on the intensity of the grazing component, which, together with fire, is an important driving force behind vegetation development. Aspect and slope also play important roles in the distribution of plant species.

The appearance of Sweet Bushveld is mostly a short and shrubby vegetation type, the distribution and structure of which is determined by the low rainfall and grazing. Sandy areas are dominated by trees such as *Terminalia sericea*, *Rhigozum obovatum*, *Grewia flava* and *Acacia tortillus*, with the dominant grasses *Eragrostis pallens*, *Schmidtia pappophoroides*, *Eragrostis trichophora*, *Brachiaria nigropedata*, *Loudetia simplex* and *Aristida stipitata*. On shallower and drier soils, *Commiphora pyracanthoides*, *Grewia flava*, *Boscia albitrunca* and *Combretum apiculatum* are more prominent, and dense, impenetrable thickets of *Acacia erubescens*, *Acacia mellifera* and *Dichrostachys cinerea* are often encountered. Grasses, including *Panicum maximum*, *Panicum coloratum*, *Cenchrus ciliaris*, *Antheophora pubescens*, *Enneapogon scoparius* and *Urochloa mossambicensis* may be dominant.

Mixed Bushveld, as is deduced from the name, represents a great variety of plant communities, with many variations and transitions. The vegetation varies from a dense, short bushveld to a rather open tree savanna. On shallow soils *Combretum apiculatum* dominates, occurring together with *Acacia caffra*, *Dichrostachys cinerea*, *Lannea discolour*, *Sclerocarya birrea* and various *Grewia* species. The grazing is sweet and the herbaceous layer is dominated by the grasses *Digitaria eriantha*, *Schmidtia pappophoroides*, *Antheophora pubescens*, *Stipagrostis uniplumis* and various *Aristida* and *Eragrostis* species. On deeper and more sandy soils *Terminalia sericea* becomes dominant, with *Ochna pulchra*, *Grewia flava*, *Peltophorum africanum* and *Burkea africana* often prominent species. The grass sward is scanty with *Eragrostis pallens* and *Perotis patens* characteristic. The structure of this vegetation type is determined by fire and grazing.

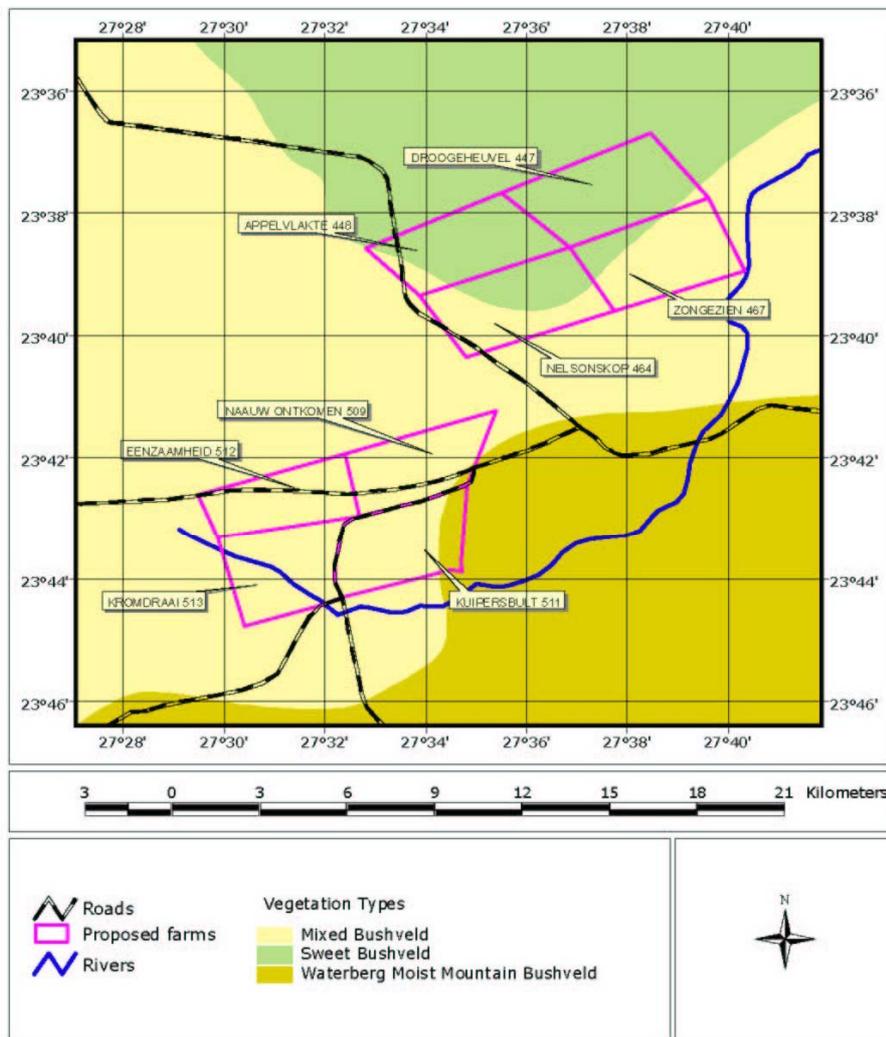


Figure 7.1: Vegetation types

7.3.2. Ecology & Biodiversity

To the north of the Magaliesberg and the west of the Great Escarpment, stretches a vast savanna region that is generally moister than the Kalahari to its west and situated at higher altitudes and less tropical in character than the lowveld savanna that lies east of the Great Escarpment. This area is popularly known as the 'bushveld'.

Surprisingly little is known about the vegetation as most studies have been done in nature reserves and game farms, but five major regions are present, three of which are represented in the study area (see Section 7.4.7).

Sweet Bushveld occurs on fertile soils in the dry and hot valleys of the Limpopo River and the thorny, small-leaved vegetation is dominated by *Acacia* species that increase to dense, impenetrable thickets at the expense of the grass layer when

overutilised. Mixed Bushveld varies from short, dense bushveld to a rather open tree savanna. On shallow, infertile soils the broad-leaved red bushwillow dominates, whereas on deeper, leached soils the silver clusterleaf becomes dominant. The Waterberg moist mountain bushveld is a typical example of moist, infertile savanna. Due to the high proportion of unpalatable grasses, the area has become known as 'sour bushveld'. An interesting phenomenon is the presence of many plant species showing affinities with the flora of the Drakensberg, which indicates an ancient link with this range.

The vegetation that characterises this area has developed many survival strategies, including the ability to produce tannins that are triggered when the leaves are browsed, the production of toxic sap, the development of thorns or their adaptation to sourveld areas that are not generally favoured by grazers. The interaction of vegetation, fire and animals play important roles in maintaining savanna ecosystems.

Over thousands of years the savanna system and the antelope that inhabit them have developed side by side. Grasses, for example, have become well adapted to defoliation, as much a defensive response to constant pressure by grazers as to the regular veld fires that rage through the savanna in the dry seasons. The success of grasses has been a constantly renewed vast reservoir of food upon which large herds of grazers flourish. The woody component is also constantly exploited by many browsers, and with so many herbivores present, the carnivore component of the complex ecological system has also flourished.

The savanna biome is populated by a greater diversity of bird species than any other biome in South Africa. The presence of both woody plants and a well-developed herbaceous layer provides diverse sources of food and shelter for specialist and generalist bird species, including seed-eaters, insectivores and diurnal and nocturnal birds of prey abound.

Much of the area is used for game farming and big game hunting, illustrating that utilisation and conservation of an area are not mutually exclusive. The savanna biome is the core of the wildlife, ecotourism and meat-production industries. Threats include rapidly expanding development of settlements for impoverished human populations and the associated need for firewood and building materials, diminishing water supply, agriculture and over-grazing.

The savanna of South Africa includes numerous animal species; approximately 167 mammals (15% endemism), 532 birds (15% endemism), 161 reptiles (40% endemism), 57 amphibians (18% endemism) and an unknown number of invertebrates. Flagship species include the Starburst Horned Baboon Spider, ground Hornbill, Cape Griffon, Wild dog, Short-Eared Trident Bat and the White Rhinoceros (Knobel, 1999).

7.4. Ecological Attributes and Status

Descriptions presented in this section are based on broad floristic and faunal observations with the principal objective being to assess the presence and status of major habitat types and relate these to the proposed development. Results of the ecological sensitivity evaluation are presented in Figure 7.2.

7.4.1. Farm Appelvlakte 448 LQ

This farm has a total extent of 882 ha, but a portion is occupied by slimes dams, rendering 704 ha as utilisable area. A site survey as well as a basic photo analysis (2327 DA 12 & 13, Chief Director of Surveys and Mapping, 1981) revealed some variation in the general physiognomy.

Environmental attributes are generally uniform across the farm; geology conforms to Arenites, Ah85 represents the only land type unit, while the largest part of the farm conforms to the Sweet Bushveld vegetation type with only a small portion of the farm (west) representing the Mixed Bushveld vegetation type. The topography of the farm is flat, sloping in a north-eastern direction from approximately 900 m in the north-west to 870 m.

An assessment of the available habitat during the site investigation confirmed the variation in the woody layer, which is attributed to localised variations in the soils. The Ah85 land type unit is characterised by relative flat areas, dominated by deep, sandy soils that belong mostly to the Hutton and Clovelly soil formations. Typical to the regional vegetation, two major variations are recognised on the farm, namely a broadleaf variation and an *Acacia* savanna.

The broadleaf variation prevails on deep, sandy soils that are poor in nutrients as a result of leaching; resulting in sour veld conditions is characterized by the profusion of tree species such as *Terminalia sericea*, *Sclerocarya birrea*, *Combretum apiculatum*, *C. zeyheri*, *Burkea africana* and *Euclea divinorum*. On shallower soils with slightly higher clay content, *Acacia* species predominate, including *A. tortillus*, *A. nilotica*, *A. erubescens*, *A. mellifera*, together with *Dichrostachys cinerea*, *Grewia* species and *Boscia albitrunca*. As a result of the slightly higher clay content, leaching of soil nutrients is not as severe as in sandy areas and the resulting vegetation is sweeter. Typically this vegetation is preferred by cattle and game, accounting for the intensive grazing noted in some areas.

Both these variations are in a prime condition and while the density of the woody layer varies across the farm, no area of excessive encroachment is noted that could be attributed to poor management. The herbaceous layer is well-developed

in most areas, although being relative bare in some places, which is normal for areas where sandy soils predominate. No immediate indication of over-utilisation was noted during the site investigation and the faunal assemblages that utilise these variations are expected to be diverse. Impacts that contribute negatively towards the status of this farm include road infrastructure, mining infrastructure as well as historic agricultural fields.

- Floristic sensitivity: Medium
- Faunal sensitivity: Medium-high
- Ecological sensitivity: Medium-high

7.4.2. Farm Nelsonskop 464 LQ

The farm is 848 ha in extent and is presently used for game farming. A portion is occupied by a sewage works, rendering 660 ha as utilisable area.

Environmental attributes vary greatly across this farm, resulting in the development of varied and distinct broadleaf and *Acacia* habitats. Geology is represented by Arenite, Shale as well as a small portion of Basalt to the west. While the Ah85 land type unit dominates, Ae252 as well as Bc44 are represented in the south, and both the Sweet Bushveld and Mixed Bushveld vegetation types are represented. Although largely similar to the vegetation of Appelvlakte, the distribution of these variations is more distinct as a result of smaller ecotonal areas caused by greater variation in environmental attributes, particularly local variations of the soil, which mostly include the Hutton and Clovelly soil formations and, to a lower degree Mispah, Oakleaf, Longlands, Dundee and Avalon. The clay content of the soils, which might vary from 2% to 20%, is considered an important attribute that influences vegetation development and distribution patterns.

A site survey as well as a basic photo analysis (2327 DA 12, 13, 17 & 18, Chief Director of Surveys and Mapping, 1981) revealed the obvious variations in habitat, with the Nelsonskop outcrop being the most obvious and important topographical and ecological variation. Trees that occur abundantly in this particular variation include *Croton gratissimus*, *Pappea capensis* and *Ficus* species. The substrate is dominated by rocks in a stapled formation, creating atypical vegetation, contributing to a highly sensitive floristic and ecological status.

Historic agricultural practices have resulted in degradation of the vegetation in the southern part of the farm. This is reflected in the lower woody cover that resulted from selective clearing, also resulting in an unnatural species composition and dominance in the woody and the herbaceous layers.

In spite of mentioned impacts, the ecological sensitivity of this farm is considered high, mainly as a result of the presence of the Nelsonskop outcrop, but also as a result of the presence of various well-developed and distinct habitat and the high connectivity to large untransformed areas, providing sink habitats for many faunal species.

- Floristic sensitivity: High
- Faunal sensitivity: High
- Ecological sensitivity: High

7.4.3. Farm Naauwontkomen 509 LQ

This farm is 807 ha in extent and is currently utilised in a breeding programme. A site survey as well as a basic photo analysis (2327 DA 22 & 17, Chief Director of Surveys and Mapping, 1981) revealed major habitat variations on this farm. In terms of environmental attributes the geology, regional vegetation, land types and soil potential present attributes that contribute to variations in the composition, species dominance and physiognomy of the vegetation. Variation in topography is limited, with altitude ranging from approximately 911 m to 875 m, sloping generally in a north-eastern direction. Impacts present on the farm include roads and railways.

Physiognomic variations that were observed include *Acacia*-, broadleaf-, closed- as well as dry savanna, conforming to the diverse nature of the Mixed Bushveld. The northern section of this farm can generally be considered as open savanna (based on 1981 aerial photography) while the tree component is more dominant in the southern section. The grass layer is, mostly, well-developed as the tree component is not particularly dominant in any place. Woody species frequently encountered include *Acacia tortilis*, *A. nigrescens*, *A. erioloba*, *A. nilotica*, *Grewia flava*, *Combretum apiculatum*, *Dichrostachy cinerea* as well as the grasses *Panicum maximum*, *Digitaria eriantha* and various *Eragrostis* species.

Several historic impacts occurred prior to 1981, influencing the current status of vegetation, the most significant being the clearing of vegetation in the western, southern and eastern parts. These impacts are considered permanent and significant. More recent influences resulted from the use of this farm for breeding purposes (Sable Antelope and Roan), which necessitated the physical manipulation of the vegetation to suit the habitat requirements of these antelope species. The woody component was affected severely as vast expanses of this farm have been subjected to clearing operations. This impact is considered semi-permanent, affecting the species composition, structural layer and population dynamics of the woody component. The removal of the woody component furthermore alters the local dominance of vegetation structures, creating more favourable growing conditions for the grass sward, which, when becoming

dominant, excludes the woody layer through prevention of germination, smothering of woody seedlings, creation of fires with excessive heat, etc.

The ecological elements present on this farm are considered to be of low sensitivity. The presence of introduced animals is not taken into consideration in the evaluation of the faunal status. Variation in environmental attributes and a relative high diversity of habitat variations (some artificial), creating potentially diverse and species-rich habitats are effectively negated by historic and current impacts on the vegetation.

- Floristic sensitivity: Medium-low
- Faunal sensitivity: Medium-low
- Ecological sensitivity: Low

7.4.4. Farm Eenzaamheid 687 LQ

The farm is 930 ha in extent. A site survey as well as a basic photo analysis (2327 DA 21, Chief Director of Surveys and Mapping, 1981) revealed few habitat variations, conforming to the regional savanna vegetation (Mixed Bushveld).

Obvious physiognomic variations include small, localised pans with associated, dense surrounding vegetation. The origin of these pans is uncertain and is assumed to have been created during historic periods when large game frequented the area. Topographical variation on the farm is minimal, with altitude ranging from approximately 917 m to 902 m.

The farm is divided into a smaller northern and larger southern section by the Steenbokpan road running in an east-west direction. A railway is located to the south and borders a part of the southern boundary of the farm while a power line crosses the south-eastern portion of the farm, resulting in relatively fragmented habitat.

Surrounding land use is grazing by cattle, except for the farm Naauwontkomen (located directly to the east) which is grazed by game. The principal driving force behind recent vegetation development/change on this property is intensive grazing by cattle. The heavy utilisation of the herbaceous layer has resulted in the woody component becoming dominant in some areas, sometimes to the exclusion of the grass sward. This dominance of the woody layer has resulted in some areas becoming inaccessible for cattle and larger game, resulting in increased grazing pressure on other areas. Woody species frequently encountered include *Combretum apiculatum*, *Acacia nigrescens*, *Grewia flava*, *Grewia flavescens*, *Sclerocarya birrea*, *Terminalia sericea*, *Dichrostachys cinerea* and *Spirostachys africana*.

The species composition of the grass sward is poor, mainly as a result of selective grazing, consisting of species not generally associated with pristine Mixed Bushveld. Grass species that enjoys high cover values include *Aristida congesta* ssp *barbicollis*, *Eragrostis rigidior* and *Eragrostis lehmanniana*. A high cover of *Melhania* spp forbs also occurs. The significance of the poor status of the vegetation was particularly evident during the site investigations, and during this period the herbaceous layer should have been in the best possible condition, allowing for adequate cover during the dry period.

The effect of over-utilisation noted on this farm is not considered irreversible and the implementation of a proper management programme, addressing issues of correct carrying capacity and stocking rates as well as the implementation of a fire management strategy could result in an improvement of the vegetation. As a result, the floristic status of this property is based on the inherent potential and is not purely based on the current status. The existing faunal diversity is considered severely compromised by the current low status of the available habitat.

- Floristic sensitivity: Medium
- Faunal sensitivity: Low
- Ecological sensitivity: Medium-low

7.4.5. Farm Droogeheuvel 447 LQ

This farm is 1 270 ha in extent and is used for game farming. Few environmental variations are encountered on this farm; the geology is represented by Arenite and Shale, the Ah85 land type unit is exclusively present and the vegetation is represented by Sweet Bushveld. The topography is generally flat, sloping slightly in an eastern direction. A site survey and a basic photo analysis (2327 DA 13, Chief Director of Surveys and Mapping, 1981) revealed the manipulated nature of vegetation on this farm, which was confirmed during the site investigation.

The intensive nature of farming practices is evident on aerial images, even as far back as 1981. The current condition is considered worse than the 1981 status as extensive areas where vegetation manipulation were applied are present in addition to the large expanses of historic agricultural fields. As a result of the intensive nature of habitat manipulation and utilisation, the herbaceous layer is degraded and depleted of most palatable grass species, containing a high degree of forbs normally associated with high grazing pressures. This impact is highly noticeable, in spite of a well-developed woody layer. A particularly intensive road infrastructure is also present on the farm, presumably for the purpose of hunting, providing easy access to most areas, also contributing to the impacts noted on this property.

The degraded status of vegetation does not extend for the entire farm, and parts of the farm are considered to be in a good condition, particularly the western and eastern portions. Farms surrounding this property are considered to be of high ecological status and the connectivity of the general area is therefore not compromised as a result of the degraded status of parts of this farm. The faunal diversity is expected to be relatively high as a result of the presence of portions of the farm which are in a good condition. The abundance of species is, however, expected to be lower, in spite of adjacent source areas.

- Floristic sensitivity: Low
- Faunal sensitivity: Medium-high
- Ecological sensitivity: Medium

7.4.6. Farm Zongezien 467 LQ

This farm, 1 200 ha in extent, is used for cattle and game farming and is considered to be in a good condition, containing *Acacia* and broadleaf variations typical of the regional vegetation.

Some variation in environmental attributes is present; geology is exclusively represented by shales, but land type units Ah85 and Bc44 are equally represented on the farm. Vegetation of the farm conforms mostly to Mixed Bushveld, but the north-western portion of the farm contains elements of the Sweet Bushveld. Soil formations that occur extensively include Hutton, Clovelly, Avalon, Oaklands and Dundee. The clay percentage of the A-horizon is typically lower than 8%, providing a deep, sandy substrate. The topography is relative flat, with slight undulations. A lowland area is present in the central part of the farm, forming an informal drainage line.

A site survey as well as a basic photo analysis (2327 DA 13, Chief Director of Surveys and Mapping, 1981) revealed distinct variations similar to the farm Nelsonskop, including dense *Acacia* woodlands and broadleaf savanna. The vegetation in some areas tends to be denser, containing a high degree of *Acacia* species, mainly as a result of the situation of the units lower on the landscape on soils that have slightly higher clay content.

The vegetation of this farm is considered to be in a good condition, and proper grazing practices are applied. The herbaceous layer does not exhibit indications of severe grazing and a well-developed and diverse grass layer is noted in most places. The woody layer is not excessively dense and is well-developed, ranging in height from 5 m trees in the broadleaf savanna to approximately 3 m in the *Acacia* savanna.

Relatively few historic impacts in the form of agricultural fields are noted from the aerial images, but a sewage works is present in the eastern part of the farm and relative high connectivity to other relative pristine areas is attributed to this farm.

- Floristic sensitivity: Medium-high
- Faunal sensitivity: Medium-high
- Ecological sensitivity: Medium-high

7.4.7. Farm Kuipersbult 511 LQ

This farm is 1 052 ha in extent and is used primarily for cattle farming, although free-ranging game does occur.

Environmental attributes vary across the farm; Arenite represent the only geological formation, while Ah86 and Bd46 landtype units are represented as well as Mixed Bushveld and Waterberg Moist Mountain Bushveld in the eastern part of the farm. Soils are generally not suitable for arable agriculture and are dominated by deep sandy areas with the Hutton and Clovelly soil formations in the Ah86 land type unit. In the Bd46 unit the Mispah formation is dominant on the crests while Constantia, Glencoe, Westleigh, Valsrivier, Hutton and Longlands occur on the footslopes. Valley bottoms are generally dominated by the Oakleaf soil formation. The topography is flat, gently sloping towards the south east.

A site survey as well as a basic photo analysis (2327 DA 21 & 22, Chief Director of Surveys and Mapping, 1981) revealed numerous habitat variations that are attributed to the underlying soil patterns. Extremely high utilisation resulted in a degraded appearance of the habitat.

Variation in the woody component are typical of the regional vegetation and constitute *Acacia* savanna where various *Acacia* species predominate together with *Grewia* species as well as several broadleaf variations, which occur mostly in sourish areas where the soils contain less clay and nutrients leach more easily. Underlying soil conditions determine the infiltration of water and in some cases water infiltrates only to an impermeable layer. In these areas *Spirostachys Africana* (Tamboti) is dominant and the vegetation is fairly dense. Broadleaf variations may include a combination of *Combretum apiculatum*, *Faurea saligna*, *Burkea africana*, *Grewia* species, *Ochna pulchra*, *Euclea crispa* and *Terminalia sericea* or *Combretum apiculatum*, *Dichrostachys cinerea*, *Lannea discolor*, *Sclerocarya birrea* and *Grewia* species.

Localised areas are present where the herbaceous cover is extremely low and the soil is gravelly and rocky outcrops may occur, creating a specific physiognomy that is restricted to this farm and the farm Kromdraai.

In spite of the numerous habitat variations present on this farm, the vegetation, particularly the herbaceous layer, is in a poor condition. Powerline servitudes traversing the farm and poor management in terms of stocking rates have affected the status of vegetation adversely. The effects of high grazing pressure on the vegetation is not considered irreversible and the implementation of a scientifically compiled management programme, addressing issues of correct carrying capacity and stocking rates as well as a fire management strategy, could result in a drastic improvement of the vegetation cover and composition within a few years.

Based purely on the current status of vegetation, the degraded appearance of the herbaceous layer, low basal cover in most areas, high occurrence of forb species and slight encroachment that is present in some areas, the level of floristic sensitivity should result in a low or medium-low ecological sensitivity level. However, numerous, distinct and atypical phytosociological and physiognomic variations result in also providing diverse habitat for faunal assemblages, placing this farm in a higher sensitivity category. Since the degradation is not perceived as permanent more weight was afforded to the inherent characteristics of the vegetation in assessing the floristic sensitivity.

- Floristic sensitivity: Medium-high
- Faunal sensitivity: Medium
- Ecological sensitivity: Medium-high

7.4.8. Farm Kromdraai 690 LQ

This farm is 922 ha in extent and is used for cattle farming. Relatively low variation is noted in terms of environmental attributes on this farm; the geology represents mainly Shale with some Arenite in the east, the Ah86 and Bd46 land type units are equally represented, while the vegetation conforms to Mixed Bushveld. Soils are generally not suitable for arable agriculture and are dominated by deep sandy areas with the Hutton and Clovelly soil formations in the Ah86 land type unit. In the Bd46 unit the Mispah formation is dominant on the crests while Constantia, Glencoe, Westleigh, Valsrivier, Hutton and Longlands occur on the footslopes. Valley bottoms are generally dominated by the Oakleaf soil formation. The topography is flat.

A site survey as well as a basic photo analysis (2327 DA 21, Chief Director of Surveys and Mapping, 1981) however revealed relatively diverse habitat, with *Acacia* and broadleaf savanna. Distinct, atypical habitats are present, particularly in the south-eastern part of the property, probably as a result of outcropping of underlying geological formations.

Low stocking rates resulted in few areas being overgrazed. The herbaceous layer is in a prime condition with a well-developed grass layer, consisting of species such as *Digitaria eriantha*, *Schmidtia pappophoroides*, *Stipagrostis uniplumis*, *Aristida stipitata*, *Eragrostis pallens* and *Perotis patens* and a low forb component.

In assessing the ecological sensitivity of habitat on this property, it was taken into account that the vegetation represents a prime example of the regional vegetation and no significant human impacts are evident. Faunal assemblages are expected to mirror the high quality of the habitat, the only slightly adverse impact being the presence of cattle, occupying habitat that would otherwise be available for natural game species. In terms of floristic diversity, major variations are present and this farm is also highly connected to large untransformed areas, providing excellent sink habitats for many faunal species.

- Floristic sensitivity: High
- Faunal sensitivity: Medium-high
- Ecological sensitivity: High

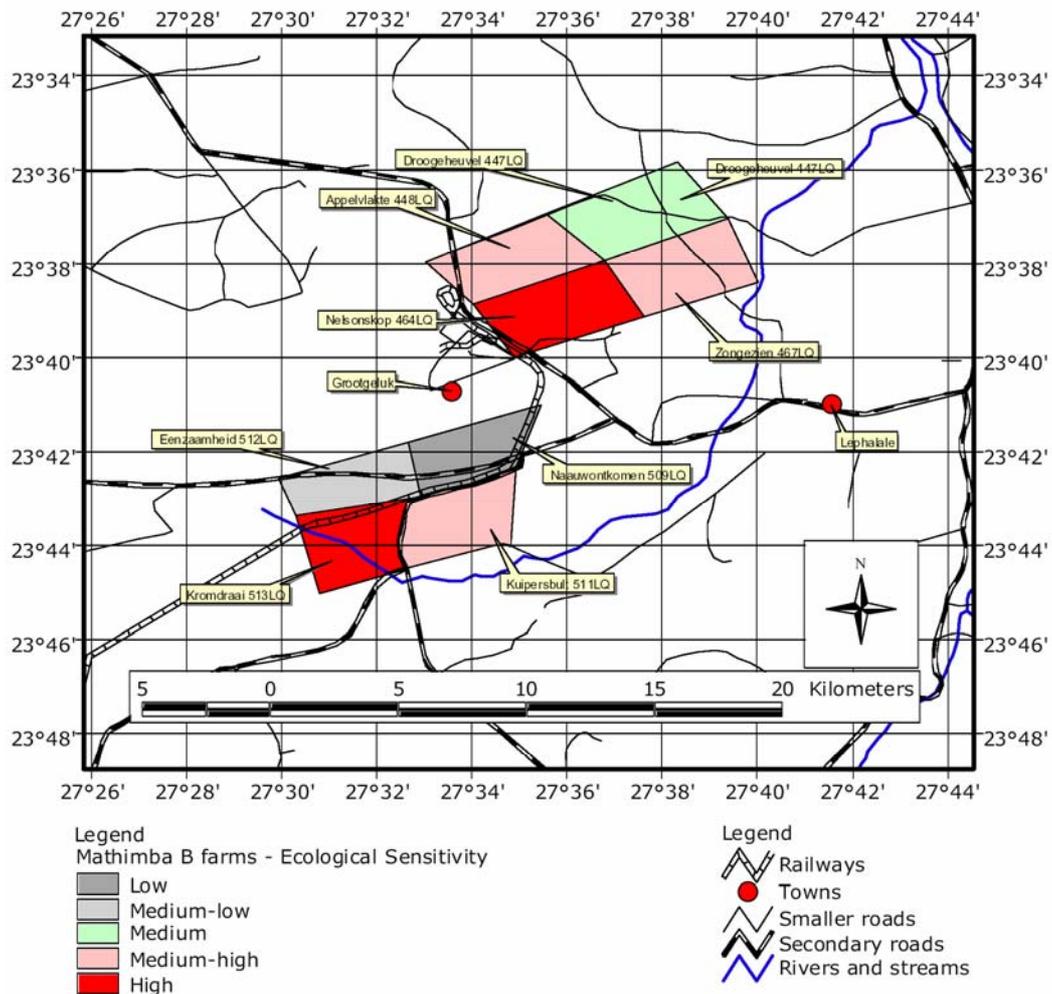


Figure 7.2: Ecological Sensitivity of the proposed farms

7.5. Red Data Species

7.5.1. Red Data Flora

The Interim Red Data List of South African Plant Species (Threatened Species Programme, 2004) indicates a total of 319 potential red data species for the Limpopo Province. Comparison of this list of red data species with the PRECIS list (309 species) for the relevant ¼ degree grid in which the proposed farms fall (2327DA), revealed the confirmed presence of 4 Red Data flora species within the relevant ¼ degree grid (Table 7.1).

Table 7.1: Red Data Flora species occurring within 2327DA

Taxon	Family	Summary	SA Endemic	Rarity
Barleria mackenii Hook.f.	Acanthaceae	Least Concern		
Barleria rehmannii C.B.Clarke	Acanthaceae	Data Deficient		Rare
Euphorbia waterbergensis R.A.Dyer	Euphorbiaceae	Threatened	Endemic	
Gossypium herbaceum L. ssp. africanum (Watt) Vollesen	Malvaceae	Least Concern		

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well-studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

A taxon with a Threatened status is placed in one of three categories, namely Critically Endangered (when it is facing an extremely high risk of extinction in the wild in the immediate future), Endangered (when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future) or Vulnerable (when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future).

An assessment of the available habitat indicates a medium - low potential of the selected farms to contain any of these species. However, the Precautionary Principle dictates that, in the absence of a detailed Red Data Flora Investigation, the presence of these species be assumed on the properties.

7.5.2. Protected Tree Species

A list of trees was produced by the South African National Botanical Institute that contain certain tree species that does not have any Red Data status, but are considered important in a South African perspective as a result of scarcity, high utilisation, common value, etc. Comparing results of the preliminary investigation and general information with this List of Protected Trees (South African National Botanical Institute, 2004); the presence of the following protected tree species within the proposed farms was revealed (Table 7.2).

Table 7.2: Protected tree species occurring within 2327DA

Botanical Name	Family	Common Name	Probability of Occurrence
Acacia erioloba	Mimosaceae	Camel thorn	Definite
Boscia albitrunca	Capparaceae	Shepard's tree	Definite
Sclerocarya birrea subsp. caffra	Anacardiaceae	Marula	Definite

7.5.3. Red Data Fauna

The Red Data fauna lists (Red Data Book of the Mammals of South Africa – 2004, Roberts' Multimedia Birds of Southern Africa – 2003, Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland – 2004 and IUCN Red List of Threatened Species – 2003) indicated 61 Red Data faunal species to be listed for the area investigated, belonging to the following disciplines (Table 7.3):

- 1 frog
- 1 snake
- 29 birds
- 30 mammals

Table 7.3: Red Data Fauna Species for the Study Areas

Biological Name	English Name	Red Data Status
Frogs		
Pyxicephalus adspersus	Giant Bullfrog	Near Threatened
Snakes		
Xenocalamus transvaalensis	Transvaal Quillsnout Snake	Data Deficient
Birds		
Alcedo semitorquata	Half-collared Kingfisher	Near Threatened
Aquila rapax	Tawny Eagle	Vulnerable
Ardeotis kori	Kori Bustard	Vulnerable
Bucorvus leadbeateri	Southern Ground-Hornbill	Vulnerable
Buphagus erythrorhynchus	Red-billed Oxpecker	Near Threatened
Ciconia nigra	Black Stork	Near Threatened
Circus macrourus	Pallid Harrier	Near Threatened
Ephippiorhynchus senegalensis	Saddle-billed Stork	Endangered
Falco biarmicus	Lanner Falcon	Near Threatened
Falco naumanni	Lesser Kestrel	Vulnerable
Falco peregrinus	Peregrine Falcon	Near Threatened
Glareola nordmanni	Black-winged Pratincole	Near Threatened
Gorsachius leuconotus	White-backed Night-Heron	Vulnerable
Gyps africanus	White-backed Vulture	Vulnerable
Gyps coprotheres	Cape Vulture	Vulnerable
Hieraaetus ayresii	Ayres's Hawk-Eagle	Near Threatened
Leptoptilos crumeniferus	Marabou Stork	Near Threatened
Mycteria ibis	Yellow-billed Stork	Near Threatened
Pelecanus rufescens	Pink-backed Pelican	Vulnerable
Phoenicopterus minor	Lesser Flamingo	Near Threatened
Phoenicopterus ruber	Greater Flamingo	Near Threatened
Podica senegalensis	African Finfoot	Vulnerable
Polemaetus bellicosus	Martial Eagle	Vulnerable
Rostratula benghalensis	Greater Painted-snipe	Near Threatened
Sagittarius serpentarius	Secretarybird	Near Threatened
Terathopius ecaudatus	Bateleur	Vulnerable
Torgos tracheliotus	Lappet-faced Vulture	Vulnerable
Trionoceph occipitalis	White-headed Vulture	Vulnerable
Vanellus albiceps	White-crowned Lapwing	Near Threatened
Mammals		
Acinonyx jubatus	Cheetah	Vulnerable
Atelerix frontalis	South African Hedgehog	Near Threatened
Clootis percivali	Short-eared Trident Bat	Critically Endangered
Crocidura cyanea	Reddish-grey Musk Shrew	Data Deficient
Crocidura hirta	Lesser Red Musk Shrew	Data Deficient
Crocuta crocuta	Spotted Hyaena	Near Threatened
Damaliscus lunatus lunatus	Tsessebe	Endangered

Biological Name	English Name	Red Data Status
<i>Dasymys incomtus</i>	Water Rat	Near Threatened
<i>Diceros bicornis minor</i>	Black Rhinoceros	Vulnerable
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	Data Deficient
<i>Elephantulus intufi</i>	Bushveld Elephant-shrew	Data Deficient
<i>Graphiurus platyops</i>	Rock Dormouse	Data Deficient
<i>Hippotragus equinus</i>	Roan Antelope	Vulnerable
<i>Hippotragus niger niger</i>	Sable Antelope	Vulnerable
<i>Hyaena brunnea</i>	Brown Hyaena	Near Threatened
<i>Lemniscomys rosalia</i>	Single-striped Mouse	Data Deficient
<i>Leptailurus serval</i>	Serval	Near Threatened
<i>Lycaon pictus</i>	African Wild Dog	Endangered
<i>Manis temminckii</i>	Pangolin	Vulnerable
<i>Mellivora capensis</i>	Honey Badger	Near Threatened
<i>Miniopterus schreibersii</i>	Schreiber's Long-fingered Bat	Near Threatened
<i>Myotis tricolor</i>	Temminck's Hairy Bat	Near Threatened
<i>Panthera leo</i>	Lion	Vulnerable
<i>Pipistrellus rusticus</i>	Rusty Bat	Near Threatened
<i>Poecilogale albinucha</i>	African Weasel	Data Deficient
<i>Rhinolophus blasii</i>	Peak-saddle Horseshoe Bat	Vulnerable
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	Near Threatened
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	Near Threatened
<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat	Near Threatened
<i>Tatera leucogaster</i>	Bushveld Gerbil	Data Deficient

Species of specific concern include the Pangolin (Vulnerable) and Southern Ground Hornbill (Vulnerable) as a result of a high Probability of Occurrence in the general area.

The Probability of Occurrence for each Red Data species listed above was estimated separately for each of the farms, implementing the known distributional ranges of the species and the estimated availability of habitat and food relevant to each species. These estimations were used to calculate the RDSIS (Red Data Sensitivity Index Score) for each farm, enabling a direct comparison of farms in terms of Red Data faunal sensitivity. Based on these estimations, Red Data Sensitivities of the farms are outlined in Table 7.4.

Table 7.4: Red Data fauna Probability of Occurrence Estimations

Farms	Criteria						
	Environmental Diversity	Habitat Diversity	Habitat Status	Connectivity	RDSIS	Total	RD Sensitivity
Appelvlakte	75	75	85	95	58	78%	Medium-high
Droogeheuvel	20	20	15	95	39	38%	Medium-low
Eenzaamheid	40	40	55	20	48	41%	Medium
Kromdraai	80	85	85	95	60	81%	High
Kuipersbult	70	65	65	55	52	61%	Medium-high
Naauwontkomen	15	15	10	15	10	13%	Low
Nelsonskop	95	95	90	90	63	87%	High
Zongesien	70	70	75	85	56	71%	Medium-high

The sensitivity for each farm reflects the environmental diversity, habitat diversity, habitat status and connectivity of the area. The Probability of Occurrence of Red Data species in a given area is inherently dependant on habitat status and diversity.

7.6. Sensitive Habitat Types

Unless a vegetation type is considered under severe threat from impacts on a regional or national scale, such as the Rocky Highveld Grassland in the Grassland Biome are threatened by development and large-scale agriculture, the regional vegetation is generally not considered as particularly sensitive. However, even within areas that are not considered particularly sensitive, atypical and localised variations exist that are considered sensitive as the species composition within these areas is dissimilar to the surrounding vegetation. In addition, the association of these areas with Red Data flora species has been indicated in various scientific reports. Such habitat types include rocky outcrops, riparian areas and any habitat type that is topographically or environmentally distinctly dissimilar to the general surrounds.

The rationale behind the sensitivity associated with these areas and the contributing environmental features is a result of micro-habitats that are created, which are not abundantly represented in the general area. Due to changes in vegetation characteristics over short distances (ecotonal areas), the species composition and vegetation structure will vary greatly and hence an increase in the diversity of species (faunal and floral) that occupies an area is noted. These areas, in effect, thus represent localised areas of high biodiversity and because of the restricted distribution, any adverse impact on these areas is considered significant.

The topographical similarity of the general area where the eight farms are located is characteristic to the area, but Nelsonskop is a typical example of atypical

vegetation that results from environmental attributes that are dissimilar to the general area. No distinct riparian areas are present and the general vegetation conforms largely to the regional vegetation types.

However, on closer inspection, some areas are present that are considered atypical to the general surrounds and, in addition to Nelsonskop, include numerous smaller variations identified on the Kuipersbult, Kromdraai and Eenzaamheid farms. The high incidence of rocks, steep slopes and shallow soils provide for a vegetation cover that is completely different to surrounding areas. In terms of the general ecology, an atypical faunal assemblage could also be expected in this area.

Small, localised pans were observed on the Eenzaamheid property and represent areas of surface water. These pans, presumably, were created by large game during periods when they still roamed the area freely. Associated vegetation indicates the well-established status of these features.

The presence of these environmentally sensitive areas is prioritised in assessing the suitability of the various farms for the proposed development and may even dictate the ecological sensitivity attributed to an area.

7.7. Nature and Extent of Impacts

In order to evaluate issues and assign an order of priority, it is necessary to identify the nature (what causes the effect, what will be affected and how it will be affected) and extent (whether the impact will be limited to the immediate area or site of the development activity, limited to the immediate surroundings, sub-regional, regional, and/or national) of each potential issue/ impact.

In assessing the potential impacts, the following assumptions are made:

- The proposed project implies total and final habitat destruction (i.e. 100% removal of natural vegetation and destruction of ecosystem attributes).
- Until such time that the absence of Red Data species on a property could be confirmed by means of a detailed Red Data investigation, the Precautionary Principle dictates the assumption that Red Data species occur on the property;
- The proposed property will be affected similarly and entirely;
- The duration of the impact will be permanent; and
- No relevant impacts are anticipated to have a neutral or positive influence on the ecological habitats.

The following adverse impacts were identified that were taken into consideration in assessing the suitability of individual farms for the proposed development:

- Impact 1 – destruction of pristine floristic and faunal habitat within development area.
- Impact 2 – destruction of Red Data flora and fauna species and suitable Red Data habitat.
- Impact 3 – destruction of protected tree species and associated habitat.
- Impact 4 – destruction of sensitive ecological habitat types (outcrops, riparian fringes, non-perennial streams, etc.).

Results of this assessment are presented in Table 7.5 and 7.6.

7.7.1. Farm Appelvlakte 448 LQ

- *Destruction of pristine habitat within development area:*
The nature of the development entails the destruction of all natural habitat on the property. A medium-high ecological sensitivity is slightly negated by the presence of mining infrastructure and historic agricultural fields. Effects of the proposed development are expected to be limited to the site of development and would affect habitats within the immediate surrounds only to a low degree. Areas of similar habitat diversity and status are also present in surrounding areas and the impact is considered to be of medium-high significance.
- *Destruction of Red Data species and Red Data habitat*
Red data species as well as suitable habitat will be destroyed during the proposed development. The likelihood that Red Data species do occur on the property is considered to be medium. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a moderate degree. The importance of Red Data species and suitable habitat is of international concern and therefore the impact is considered to be of medium-high significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern, therefore the impact is considered to be of medium-high significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. No areas of particular environmental sensitivity occur on this property. Effects of the proposed development are expected to be limited to the site of development and would

affect the immediate surrounds only to a low degree. The impact is considered to be of medium-low significance.

A medium-low suitability for development is attributed to this property as a result of the well-preserved status of vegetation and presence of various habitat variations, somewhat negated by the presence of various forms of impacts.

7.7.2. Farm Nelsonskop 464 LQ

- *Destruction of pristine habitat within development area*
The nature of the development entails the destruction of all natural habitats on the property. The site investigation revealed the high ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitats within the immediate surrounds only to a low degree. The impact is considered to be of high significance.
- *Destruction of Red Data species and Red Data habitat*
Red Data species as well as suitable habitat will be destroyed during the proposed development. Based on available habitats on the farm, the likelihood that Red Data species do occur on the property is considered medium-high. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. Five fauna species, namely the Lesser Red Musk Shrew (*Crocidura hirta*), the South African Hedgehog (*Atelerix frontalis*), the Honey Badger, (*Mellivora capensis*), the Bushveld Gerbil (*Tatera leucogaster*) and the Reddish-grey Musk Shrew (*Crocidura cyanea*) are estimated to have a high (>74%) Probability of Occurrence within the boundaries of Nelsonskop. The importance of Red Data species and habitat suitable for Red Data species is of international concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and habitat suitable for these species is of provincial concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do occur on this property. Effects of the proposed development are expected to be limited to the site of development and would affect the immediate surrounds only to a

low degree. Nelsonskop outcrop represents an environmental feature of particularly high sensitivity and is furthermore not represented in the general surrounds. Therefore, the impact is considered to be of high significance.

A low suitability for the proposed development is attributed to this property as a result of the presence of sensitive habitat types as well as well-developed and preserved floristic variations.

7.7.3. Farm Naauwontkomen 509 LQ

- *Destruction of pristine habitat within development area*
The nature of the development entails the destruction of all natural habitat on the property. The site investigation revealed a medium-low ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitat within the immediate surrounds only to a low degree. Large parts of the habitat on this are manipulated for specialised breeding purposes and various historic impacts are present. Therefore, the impact is considered to be of low significance.
- *Destruction of Red Data species and Red Data habitat*
Red Data species as well as suitable habitat will be destroyed during the proposed development. Based on available habitats on the farm, the likelihood that Red Data species do occur on the property is considered medium-low. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The importance of Red Data species and suitable habitat is of international concern. Therefore, the impact is considered to be of medium significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern. However, as a result of the degraded status of vegetation on this property, fewer of these species are expected to occur on this property. Therefore, the impact is considered to be of medium significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do not occur on this property. Effects of the proposed development are expected to be limited to the site of development and would affect the immediate surrounds only to a

low degree. No particular areas of environmental sensitivity are present on this property. Therefore, the impact is considered to be of low significance.

A high suitability for the proposed development is attributed to this property. Habitat status is low as a result of physical manipulation and historic impacts.

7.7.4. Farm Eenzaamheid 687 LQ

- *Destruction of pristine habitat within development area*

The nature of the development entails the destruction of all natural habitat on the property. The site investigation revealed a medium-low ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitat within the immediate surrounds only to a low degree. High grazing pressure has resulted in slight degradation of the habitat, leading to depleted herbaceous layer and encroachment of the woody layer. Few variations are present, including vegetation associated with small pans. Therefore, the impact is considered to be of medium-low significance.
- *Destruction of Red Data species and Red Data habitat*

Red Data species as well as suitable habitat will be destroyed during the proposed development. The likelihood that Red Data species do occur on the property is considered medium-low. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The importance of RD species and habitat suitable for Red Data species is of international concern. Therefore, the impact is considered to be of medium significance.
- *Destruction of protected tree species and suitable habitat*

These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern. However, as a result of the degraded status of habitat on this property, fewer of these species are expected to occur on this property. Therefore, the impact is considered to be of medium significance.
- *Destruction of sensitive habitat types*

All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do occur on this property, but are localised. Effects of the proposed development are expected to be limited to the site of development and would affect the immediate surrounds only to a low degree. The presence of several small

pans increases the sensitivity of this farm slightly. Therefore, the impact is considered to be of medium significance.

The suitability of this farm for the proposed development is considered to be medium-high, in spite of the presence of localised areas that are considered sensitive. The degraded nature of the vegetation with low variation, contributes to the suitability of this property for the proposed development.

7.7.5. Farm Droogeheuvel 447 LQ

- *Destruction of pristine habitat within development area*
The nature of the development entails the destruction of all natural habitats. The site investigation revealed a medium ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitat within the immediate surrounds only to a low degree. In spite of a medium-high faunal sensitivity, as the general ecological status of this property is considered sub-optimal and slightly degraded. Therefore, the impact is considered to be of medium-low significance.
- *Destruction of Red Data species and Red Data habitat*
Red Data species as well as suitable habitat will be destroyed during the proposed development. The likelihood that Red Data species do occur on the property is considered medium. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The importance of Red Data species and suitable habitat is of international concern. Therefore, the impact is considered to be of medium significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern. Low numbers of these species are expected to occur on this property. Suitable habitat is also available in adjacent areas. Therefore, the impact is considered to be of medium significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do not occur on this property. Effects of the proposed development is expected to be limited to the site of development and would affect the immediate surrounds only to a low degree. Therefore, the impact is considered to be of low significance.

The difference between floristic and faunal sensitivities, low and medium-high respectively, are high, mainly as a result of the degraded nature of parts of the farm, influencing the status of vegetation adversely, while remaining parts of the farm that are not influenced in a similar manner provide adequate habitat for faunal species. The suitability of the property for the proposed development is therefore considered medium as the habitat is considered degraded in parts and no aspects of particular concern were observed. In terms of Red Data and protected species, the likelihood of these species occurring on this property is considered lower than on adjacent properties.

7.7.6. Farm Zongezien 467 LQ

- *Destruction of pristine habitat within development area*
The nature of the development entails the destruction of all natural habitats on the property. The site investigation revealed a medium-high ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitats within the immediate surrounds only to a low degree. Well-preserved and diverse habitat will attribute towards species rich environment. Therefore, the impact is considered to be of high significance.
- *Destruction of Red Data species and Red Data habitat*
Red Data species as well as suitable habitat will be destroyed during the proposed development. The likelihood that Red Data species do occur on the property is considered medium. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The importance of Red Data species and habitat suitable for Red Data species is of international concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and habitat suitable for these species is of provincial concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do not occur on this property. Effects of the proposed development are expected to be limited to the site of development and would affect the immediate surrounds only to a low degree. No particular areas of environmental sensitivity are present on this property. Therefore, the impact is considered to be of low significance.

A medium-low suitability for development is attributed to this property as a result of the well-preserved status of the habitat and the presence of distinct and diverse variations, in spite of the presence of some infrastructure on the property.

7.7.7. Farm Kuipersbult 511 LQ

- *Destruction of pristine habitat within development area*

The nature of the development entails the destruction of all natural habitat on the property. The site investigation revealed the medium-high ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitat within the immediate surrounds only to a low degree. Although the general habitat of this farm is in a relatively poor state, numerous variations and diverse habitats are present, contributing to a varied physiognomy. Atypical soil conditions contribute to the formation of distinct variations. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of Red Data species and Red Data habitat*

Red Data species as well as suitable habitats will be destroyed during the proposed development. The likelihood that Red Data species do occur on the property is considered medium. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The importance of Red Data species and habitat suitable for Red Data species is of international concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of protected tree species and suitable habitat*

These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of sensitive habitat types*

All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do occur on this property. Effects of the proposed development are expected to be limited to the site of development and would affect adjacent areas only to a low degree. Although no specific sensitive environmental features, such as rocky outcrops and surface water, are present on this property, the variation in environmental attributes contributed to the formation of habitat variations that are not abundantly represented in the general area. The presence of these variations in close association with each other is considered an important ecological attribute and the entire area is considered of relative

high sensitivity. Therefore, the impact is considered to be of high significance.

In spite of the degraded status of habitat on this property, a medium-low suitability for the proposed development is attributed to this property, mainly as a result of the diverse nature of the habitat variations present on the farm.

7.7.8. Farm Kromdraai 690 LQ

- *Destruction of pristine habitat within development area*
The nature of the development entails the destruction of all natural habitats on the property. The site investigation revealed a High ecological sensitivity of this property. Effects of the proposed development are expected to be limited to the site of development and would affect habitat within the immediate surrounds only to a low degree. Diverse habitat variations, similar to those observed on the farm Kuipersbult, are present on this property, *albeit* in a better condition. The preservation of these variations should be prioritised. Therefore, the impact is considered to be of high significance.
- *Destruction of Red Data species and Red Data habitat*
Red Data species as well as suitable habitat will be destroyed during the proposed development. Based on available habitats on the farm, the likelihood that Red Data species do occur on the property is considered Medium-high. Effects of the proposed development are expected to be limited to the site of development and would affect Red Data species and suitable habitat within the immediate surrounds only to a low degree. The Lesser Red Musk Shrew (*Crocidura hirta*) are estimated to have a high (>74%) Probability of Occurrence on this site. The importance of Red Data species and habitat suitable for Red Data species is of international concern. Therefore, the impact is considered to be of medium-high significance.
- *Destruction of protected tree species and suitable habitat*
These species as well as suitable habitat will be destroyed during the proposed development. Protected tree species do occur on the property. Effects of the proposed development are expected to be limited to the site of development and would affect protected species and suitable habitat within the immediate surrounds only to a low degree. The importance of protected species and suitable habitat is of provincial concern. Therefore, the impact is considered to be of medium significance.
- *Destruction of sensitive habitat types*
All areas that constitute environmental features of high sensitivity will be destroyed during the proposed development. Such areas do occur on this property. Effects of the proposed development are expected to be limited to the site of development and would affect the immediate surrounds only to a low degree. Similar to farm Kuipersbult, no specific sensitive environmental features, such as rocky outcrops and surface water, are present on this

property, but variation in environmental attributes contributed to the formation of habitat variations that are not abundantly represented in the general area. The presence of these variations in close association with each other is considered an important ecological attribute that would contribute to a diverse floristic and faunal composition. Therefore, the impact is considered to be of high significance.

A low suitability for the proposed development is attributed to this property as the general habitat is in a relative good condition. The presence of numerous and diverse variations necessitates the conservation of this farm.

7.8. Conclusions

7.8.1. Power Station Alternatives

Results of the evaluation are presented in Figure 7.2. The potential impacts and development suitability for the power station sites are outlined in Table 7.5.

Table 7.5: Potential Impacts and Development Suitability for Power Station

Farm	Appelvlakte 448 LQ	Nelsonskop 464 LQ	Naauwontkome 509 LQ	Eenzaamheid 687 LQ
Impact 1	2	1	5	4
Impact 2	2	2	3	3
Impact 3	2	2	3	3
Impact 4	4	1	5	3
Sensitivity	Medium-high	High	Low	Medium-low
Suitability Rating	Medium-low (2)	Low (1)	High (5)	Medium-high (4)

Based on results of this assessment, Naauwontkome would be considered the preferred site for the proposed power station as the potential impact on ecological attributes is considered to be the lowest of the sites considered for the proposed development.

7.8.2 Ancillary Infrastructure Alternatives

Results of the assessment are presented in Figure 7.3. The potential impacts and development suitability for the power station sites are outlined in Table 7.6.

With Naauwontkome nominated as the preferred development site (as per Table 7.5), in terms of ecological considerations, the farm Eenzaamheid is suggested as the preferred site for ancillary structures. However, should Naauwontkome not be selected as the development site, it should be considered to be used for the ancillary structures.

Table 7.6: Potential Impacts & Development Suitability for ancillary services

Farm	Appelvlakte 448 LQ	Nelsonskop 464 LQ	Naauw- Ontkomen 509 LQ	Eenzaamheid 687 LQ	Droogeheuvel 447 LQ	Zongezien 467 LQ	Kuipersbult 511 LQ	Kromdraai 690 LQ
Impact 1	2	1	5	4	6	1	2	1
Impact 2	2	2	3	3	3	2	2	2
Impact 3	2	2	3	3	3	2	2	3
Impact 4	4	1	5	3	5	5	1	1
Sensitivity	Medium-high	High	Low	Medium-low	Medium	Medium-high	Medium-high	High
Suitability Rating	Medium-low (2)	Low (1)	High (5)	Medium-high (4)	Medium (3)	Medium-low (2)	Medium-low (2)	Low (1)

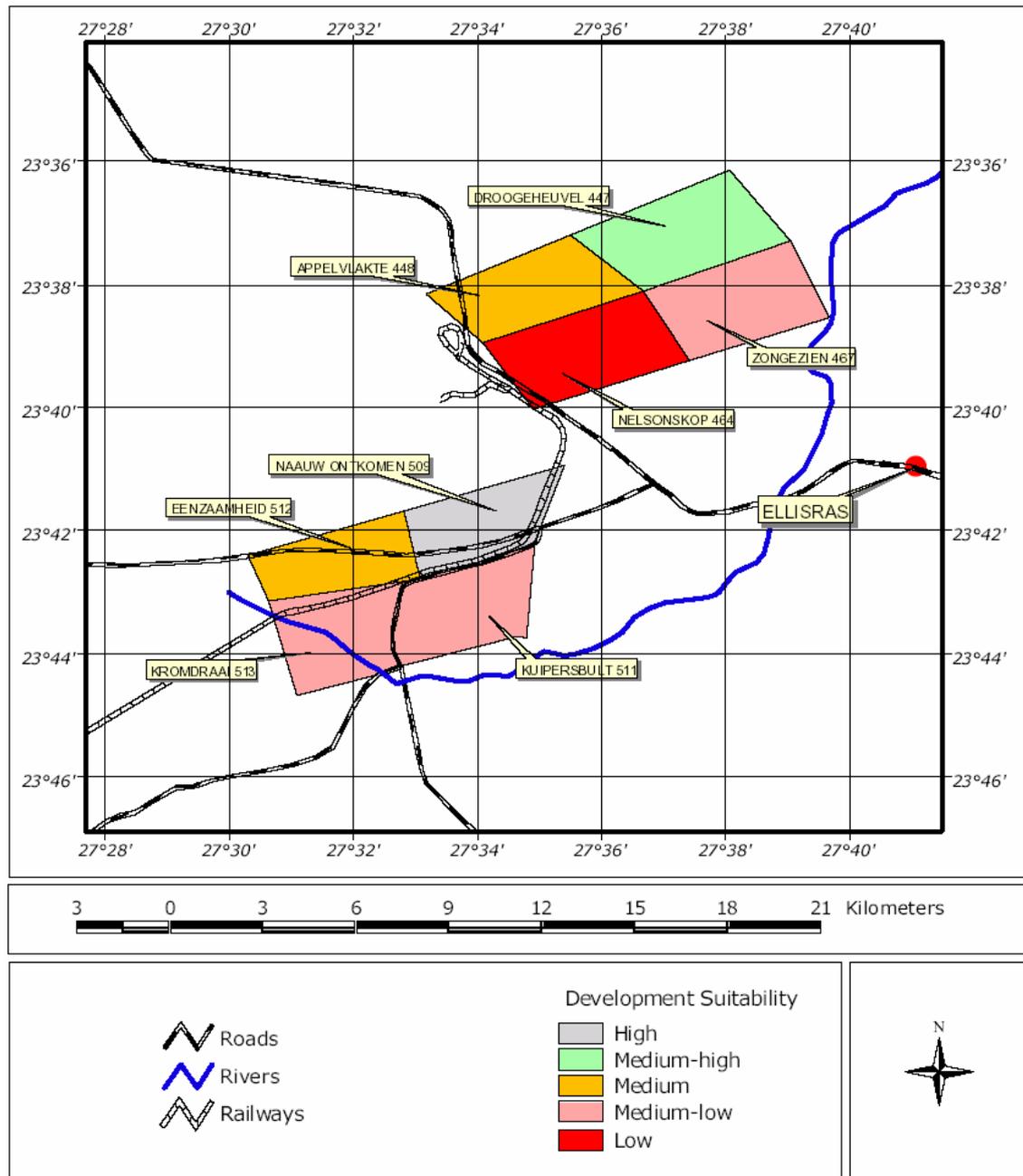


Figure 7.3: Suitability of farms for the proposed development

7.8.3. Site Preference Rating

The site preference rating for the sites in terms of fauna and flora is outlined in Table 7.7 and Table 7.8.

Table 7.7: The Site Preference Rating of the alternative Sites for the power station with regards to fauna and flora

Farm name	Site Preference Rating
Farm Appelvlakte 448 LQ	2 (not preferred)
Farm Nelsonskop 464 LQ	1 (not suitable)
Farm Naauwontkomen 509 LQ	5 (ideal)
Farm Eenzaamheid 687 LQ	4 (preferred)

Table 7.8: The Site Preference Rating of the alternative sites for the ancillary infrastructure with regards to fauna and flora

Farm name	Site Preference Rating
Farm Appelvlakte 448 LQ	2 (not preferred)
Farm Nelsonskop 464 LQ	1 (not suitable)
Farm Naauwontkomen 509 LQ	5 (ideal)
Farm Eenzaamheid 687 LQ	4 (preferred)
Farm Droogeheuvel 447 LQ	3 (acceptable)
Farm Zongezien 467 LQ	2 (not preferred)
Farm Kuipersbult 511 LQ	2 (not preferred)
Farm Kromdraai 690 LQ	1 (not suitable)

7.9. Recommendations

Due to the severe nature of the expected impacts with the construction of a proposed power station or its ancillary infrastructure, it is considered imperative to conduct a full ecological assessment on the preferred site/s. This would include, but not necessarily be limited to:

- Flora:
 - * Compile a floristic species list for the proposed site/s.
 - * Compile floristic releveès in predetermined physiognomic units.
 - * Verify the presence/ absence of Red Data flora species.
 - * Assess the status of protected tree species.
 - * Describe floristic communities, based on species composition and environmental attributes.
 - * Compile vegetation maps, indicating the distribution of floristic communities.
 - * Assess the impact of the proposed development on the vegetation of the selected site/s.

- * propose mitigation measures, where possible, to mitigate potential adverse impacts.
- Fauna:
 - * Compile a faunal species list for the proposed site/s, including mammals, small mammals, birds, terrestrial invertebrates and reptiles.
 - * Describe the faunal assemblages, based on species composition and habitat potential.
 - * Verify the presence/ absence of Red Data fauna species.
 - * Assess the impact of the proposed development on the fauna of the selected site/s.
 - * propose mitigation measures, where possible, to mitigate potential adverse impacts.
- Ecology:
 - * compile sensitivity maps, highlighting areas of particular concern.