

## Site Description

Four main vegetation types were identified, namely anthropogenic grassland, moist grassland, riparian vegetation and grazed grassland. Each of these vegetation types are described in more detail below and illustrated in Figure 38 below. The species list for the site is attached in Appendix R. The species that could occur in the quarter degree grids was obtained from the Plants of Southern Africa (POSA) online database upheld by the South African National Botanical Institute (SANBI) and supplemented with field notes. The list provides species names, common names, as well as notes on which species were observed on site. In total 198 species have been documented in the area with 103 confirmed species under the proposed routes.

### ***Hyparrhenia hirta* Anthropogenic Grassland (Grazed and Cultivated Fields)**

This tall grassland occurs over vast areas throughout Gauteng and the surrounding highveld. Disturbed grassland or other disturbed areas such as road reserves or fallow fields, not cultivated for some years, are also usually *Hyparrhenia* dominated (Coetzee et al. 1995; Bredenkamp & Brown 2003).

This *Hyparrhenia* – dominated grassland may appear to be quite natural, but they are mostly associated with an anthropogenic influence from recent or even iron-age times. This grassland is characterised by the tall growing dominant Thatch grass (*Hyparrhenia hirta*), and Bankrupt Bush (*Stoebe vulgaris*), an invader dwarf shrub which usually indicates grassland's degraded condition (Bredenkamp & Brown 2003).

This grassland mostly has low species richness, with only a few other species able to establish or survive in the shade of the dense sward of tall grass. Most of these species are relict pioneers or early seral species. The most prominent species include the grasses *Cynodon dactylon*, *Eragrostis plana*, *E. racemosa*, *E. curvula* and *Aristida congesta*. Forbs are rarely encountered, though a few individuals of species such as *Anthospermum rigidum*, *Conyza podocephala*, *Crabbea angustifolia* and *Helichrysum rugulosum* are often present (Bredenkamp & Brown 2003).

Figure 34 below provides an illustration of the *Hyparrhenia* grassland unit found among the ploughed fields in this case. In Figure 38 and Figure 39 this vegetation unit is illustrated by the cultivated fields.



**FIGURE 34: HYPARRHENIA GRASSLAND**

### **Invaded grassland**

The invaded grassland unit has arisen from the inherent susceptibility of the natural grassland of the region to be invaded by alien plants. In several places along the route the natural grassland has been invaded to such an extent that the vegetation is dominated by the alien invasive species. The most common aliens are *Acacia mearnsii* (Black Wattle), *Populus x canescens* (Poplar), *Tagetes minuta* (Khaki bush), *Bidens pilosa* (Blackjack), *Eucalyptus* (Blue Gum) and *Salix babylonica* (Wattle). This vegetation type is found in small pockets throughout the study site.



FIGURE 35: INVADED GRASSLAND

### **Moist Grassland**

The *Eragrostis plana* Grassland is well represented occurring mainly in high rainfall parts. This grassland type is a moist grassland, usually restricted to flat plains or bottomlands, mostly on moist, deep, clayey and poorly drained, seasonally wet soils, adjacent to wetlands, seasonal as well as perennial rivers. These habitats are often fairly unstable due to seasonal flooding and drying, which, together with frequent overgrazing, cause degradation of the vegetation (Bezuidenhout & Bredenkamp 1990).



FIGURE 36: ERAGROSTIS PLANA MOIST GRASSLAND

*Eragrostis plana* is conspicuous, often dominant member of this grassland type (Figure 36). *Paspalum dilatatum*, and the rhizomatous *Cynodon dactylon*, often presents in degraded sites, are also diagnostic, as well as the forbs *Crabbea acaulis*, *Berkheya radula*, *B. pinnatifida* and *Trifolium africanum*. Grass species such as *Eragrostis curvula*, *Themeda triandra*, *Setaria sphacelata* and *Digitaria eriantha* are often abundantly present, and may be locally dominant, while forbs are generally quite rare (Coetzee et al. 1995; Bredenkamp & Brown 2003).

#### **Drainage areas and wetland communities**

Drainage areas are seasonally wet areas that occur in low-lying drainage lines after rains. These areas are usually covered by hygrophytes such as sedges and reeds. The dominant sedge in the study area is *Juncus rigidus*. Sometimes bulrush (*Typha capensis*) and reeds (*Phragmites australis*) also occurs.

Wetlands are of a more permanent nature and occur in low-lying areas such as tributaries of streams and rivers. Here hydrophytes can be found. Typical plants are the Orange River Lily (*Crinum bulbispermum*), bulrush (*Typha capensis*) and reeds (*Phragmites australis*), sedges of the *Cyperus*, *Fuirena* and *Scirpus* genera also occur (Figure 37).



**FIGURE 37: SEEPAGE AREA**

#### **Grazed Grasslands**

In addition to the above vegetation types found on site, a few remaining patches of Soweto Highveld Grassland, Rand Highveld Grassland and Eastern Highveld Grassland are also found in between the cultivated fields and the streams. These grasslands are often used for grazing but the species composition remains as described in Section 7.1.9 above.

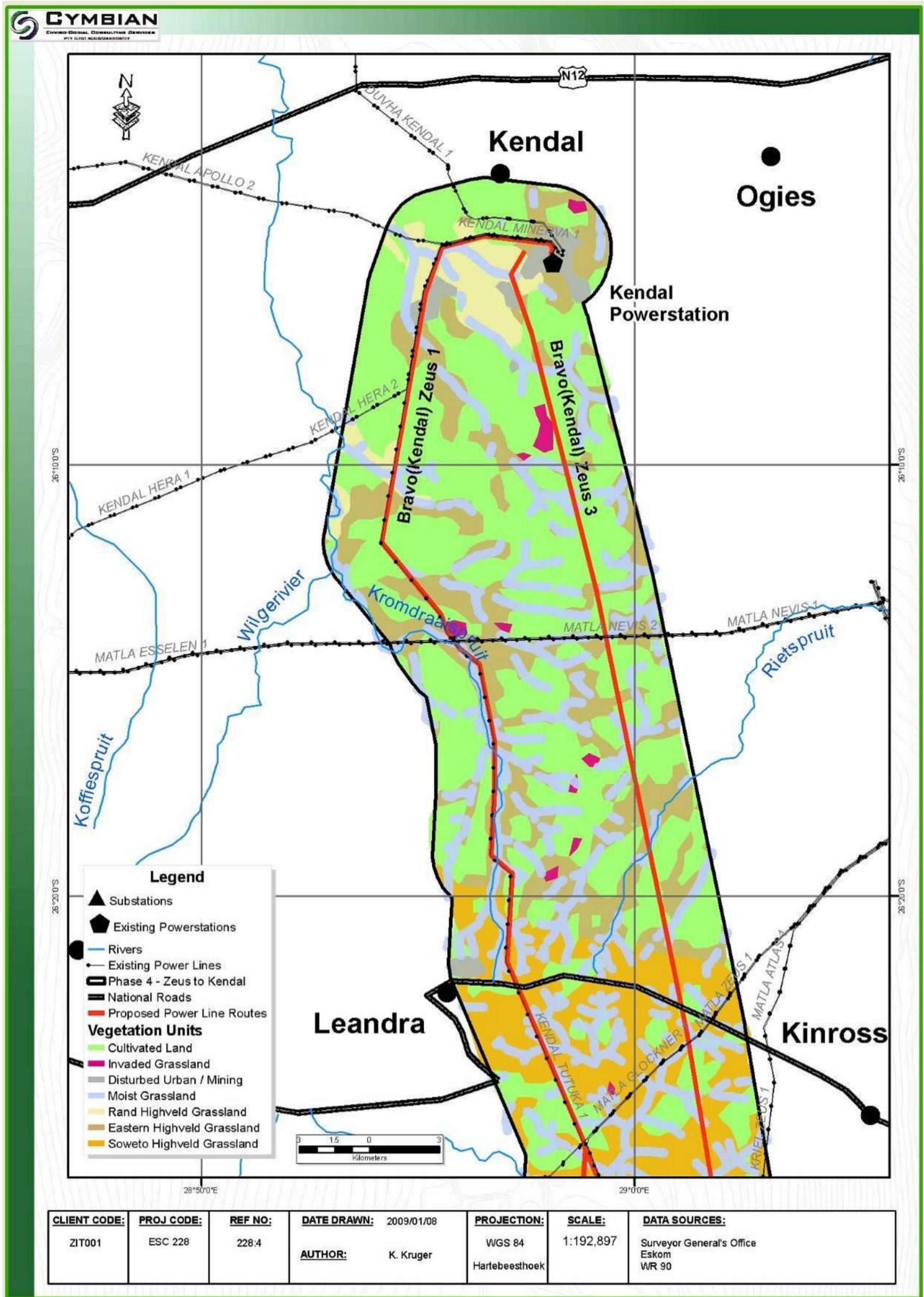


FIGURE 38: VEGETATION UNITS OF THE NORTHERN SECTION OF THE SITE.

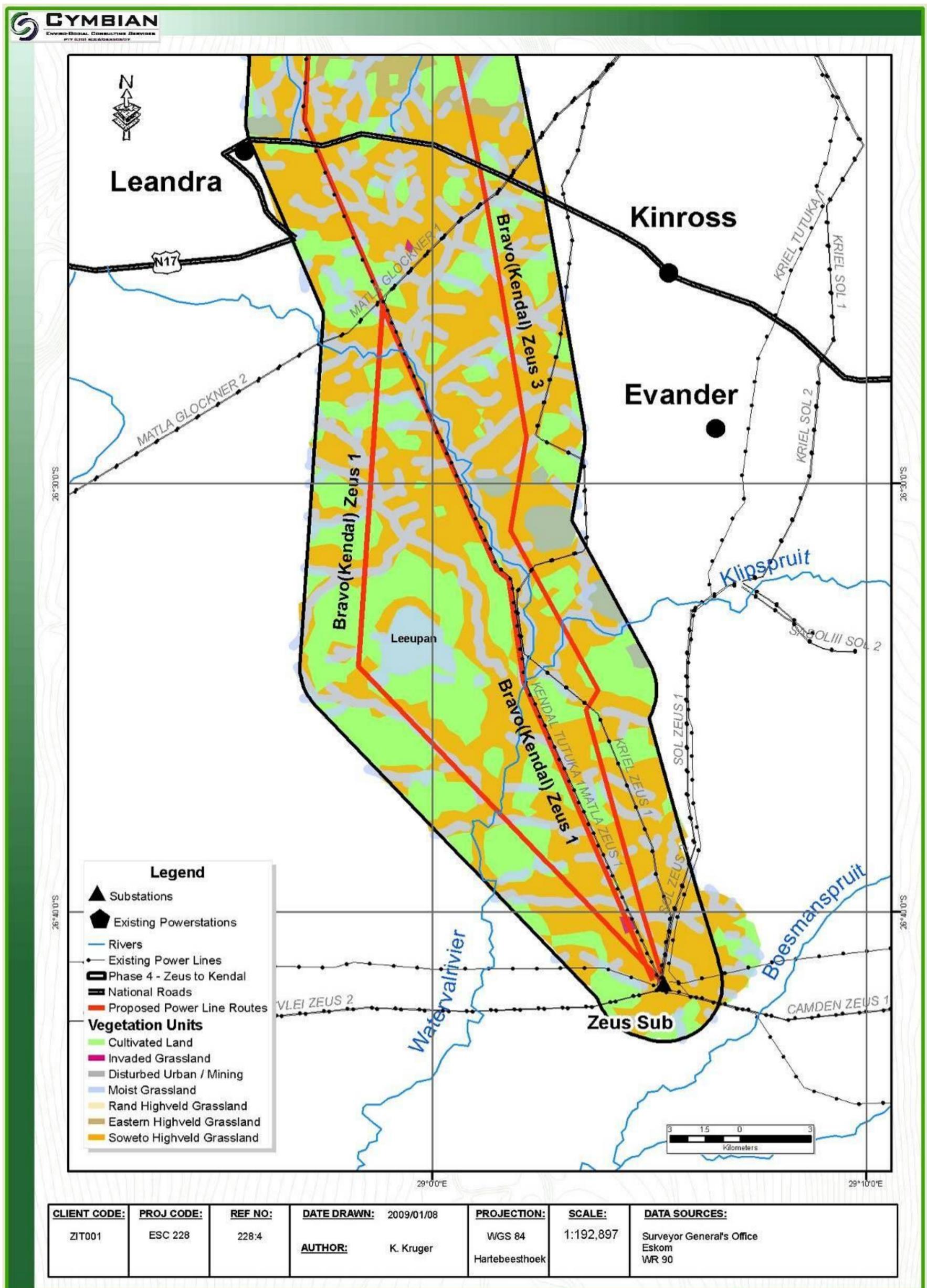


FIGURE 39: VEGETATION UNITS OF THE SOUTHERN SECTION OF THE SITE.

## Sensitive Flora

During the site assessment, special efforts were made to identify sensitive or endangered vegetation along the routes. No red data species were found along the routes but that does not exclude the potential for such species to occur. The nature of the vegetation in the area is such that the bulk of the sensitive species are associated with wetlands and streams. Therefore it is suggested that all stream and wetlands be buffered by 100m. This figure is the standard buffer zone required by the Department of Water Affairs and Forestry (DWAF) for areas outside of the urban edge.

### **7.1.9 Fauna**

#### Data Collection

A literature review of the faunal species that could occur in the area was conducted. C-Plan data provided from the Mpumalanga provincial department was used to conduct a desktop study of the area. This data consists of terrestrial and aquatic components, ratings provide an indication as to the importance of the area with respect to biodiversity. Additionally, all fauna were noted during the site visits conducted on the 8<sup>th</sup> – 12<sup>th</sup> September 2008 and the 3<sup>rd</sup> – 7<sup>th</sup> November 2008. In addition and specialist avifauna report was compiled by Mr. Chris van Rooyen<sup>4</sup>.

#### Regional Description

As a consequence of mining and farming in the area, it appears that only small animals are to be found at the site. Small mammals known to occur in the area include hedgehog, rabbits, mongoose, meerkat and the ubiquitous rats and mice. Given the habitat, it is likely that korhaans, larks, longclaws, species of Euplectes (bishops and widows), weavers, starlings and sparrows occur in the grassland.

The study area does include areas of terrestrial and aquatic habitats. These areas should be treated as sensitive and should therefore be managed accordingly; if feasible they should be avoided.

#### Site Description

The scope of work indicated that an avifauna assessment was required. This section details the avifauna assessment as well as the herpetofauna and mammals observed on site.

#### **Habitat**

The habitat on site is described in the vegetation site description in Section 7.1.8 above. All of the vegetation types identified have been disturbed to a certain extent, as the main land use in the area is dryland cultivation of grazing of livestock. The largest portion of the site is comprised of disturbed grassland, totalling

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<sup>4</sup> *Bird Impact Assessment Study, Bravo Integration Project: Phase 4, December 2008.*

approximately 61.7 % of the study site. The remainder of the site comprises rocky and moist grassland as well as seepage zones and wetlands. All of these are suitable habitat to a number of protected species found in the region.

### **Species observed on site**

A detailed list of the species observed on site is attached in Appendix R.

### **Herpetofauna**

Herpetofauna could potentially occur in all four habitat types. The seepage zones and wetlands could potentially support amphibians representative of the region. The quarter degree squares are known to contain *Agama atra* (Southern Rock Agama), *Bitens arietans* (Puff Adder), *Hemachatus haemachatus* (Rinkhals), *Causus rhombeatus* (Common Night Adder), *Lycodonomorphus rufulus* (Common Brown Water Snake), *Aparallactus capensis* (Cape Centipede Eater), *Cordylus vittifer* (Transvaal Girdled Lizard), *C. vandami* (Van Dam's Girdled Lizard), *Varanus niloticus* (Water Monitor), *Pachydactylus capensis* (Cape Thick-toed Gecko), *Leptotyphlops conjunctus conjunctus* (Cape Thread Snake) and *Mabuya capensis* (Cape Skink). *Hemachatus haemachatus* (Rinkhals) and *Leptotyphlops conjunctus conjunctus* (Cape Thread Snake) are endemic to Southern Africa. During the site visit the only one of the species above that was observed was a *Hemachatus haemachatus* (Rinkhals).

### **Avifauna**

Avifauna on site was identified during the site visits. Table 11 below provides a list of the species observed as well as their occurrence. In addition to the site observations, a detailed specialist study was undertaken and is attached in Appendix R.

TABLE 11: AVIFAUNA SPECIES LIST

Species	Common name	Occurrence
<i>Phalacrocorax africanus</i>	Reed Cormorant	Pair
<i>Ardea cinerea</i>	Grey Heron	Individual
<i>Ardea melanocephala</i>	Blackheaded Heron	Individual
<i>Bubulcus ibis</i>	Cattle Egret	Individual
<i>Bostrychia hagedash</i>	Hadedda Ibis	Pair
<i>Plegadis falcinellus</i>	Glossy Ibis	Individual
<i>Alopochen aegyptiacus</i>	Egyptian Goose	Pair
<i>Elanus caeruleus</i>	Blackshouldered Kite	Common
<i>Francolinus swainsonii</i>	Swainson's Francolin	Individual

Species	Common name	Occurrence
<i>Numida meleagris</i>	Helmeted Guineafowl	Common
<i>Fulica cristata</i>	Redknobbed Coot	Individual
<i>Gallinula chloropus</i>	Moorhen	Individual
<i>Anthropoides paradisea</i>	Blue Crane	Pair
<i>Sagittarius serpentarius</i>	Secretary Bird	Pair
<i>Eupodotis cafra</i>	Whitebellied Korhaan	Individual
<i>Vanellus armatus</i>	Blacksmith Plover	Pair
<i>Vanellus coronatus</i>	Crowned Plover	Common
<i>Streptopelia semitorquata</i>	Redeyed Dove	Pair
<i>Streptopelia senegalensis</i>	Laughing Dove	Common
<i>Asio capensis</i>	Marsh Owl	Carcass
<i>Colius striatus</i>	Speckled Mousebird	Pair
<i>Mirafraga africana</i>	Rufousnaped Lark	Common
<i>Corvus albus</i>	Pied Crow	Individual
<i>Saxicola torquata</i>	Stone Chat	Individual
<i>Phylloscopus trochilus</i>	Willow Warbler	Individual
<i>Cisticola fulvicapilla</i>	Neddicky	Individual
<i>Motacilla clara</i>	Cape Wagtail	Individual
<i>Anthus cinnamomeus</i>	Grassveld Pipit	Individual
<i>Passer domesticus</i>	House Sparrow	Common
<i>Ploceus velatus</i>	Masked Weaver	Common
<i>Euplectes orix</i>	Red Bishop	Pair

Species	Common name	Occurrence
<i>Emberiza capensis</i>	Cape Bunting	Individual

In total 32 bird species were identified during the site investigations, including some sensitive species which are discussed in more detail in Appendix R. The species on site include waterfowl, grassland specialists and common generalists. This is attributed to the variety of habitats that occur on site, as well as the adequate supply of fresh water.

**Mammals**

Several mammal species were observed on site, and it was notable that most of the species were limited to a game farm just north of the Zeus Substation. Smaller mammals such as mongoose were found throughout the site. The species identified are listed below.

TABLE 12: MAMMAL SPECIES LIST

Species	Common name	Occurrence
<i>Antidorcas marsupialis</i>	Springbok	Herd
<i>Damaliscus dorcas phillipsi</i>	Blesbok	Herd
<i>Cynictis pencilata</i>	Yellow Mongoose	Individuals
<i>Orycteropus afer</i>	Aardvark / Antbear	Individuals
<i>Connochaetes taurinus</i>	Blue wildebeest	Herd
<i>Hystrix africaeaustralis</i>	Porcupine	Individual
<i>Ceraottherium simum</i>	White Rhinoceros	Individuals



FIGURE 40: FAUNA INCLUDING SPRINGBOK (LEFT) AND BLUE WILDEBEEST (RIGHT)

### Sensitivities and power line interactions

The impacts to fauna are experienced in a number of ways, but due to the placement of the power lines on pylons the impacts are largely limited to avifauna. The construction and erection of the pylons could impact on habitat for ground dwelling fauna, but due to the large number of existing power lines in the area, this is a low possibility. Therefore the focus will be on the avifauna component.

The Red Data bird species that occur within the study area were recorded by the Bird Atlas project and are listed in Table 13 below. The species that could potentially be impacted on by the power lines are shaded in grey.

**TABLE 13: RED DATA BIRD SPECIES**

Species	Reporting rate %	Conservation status (Barnes 2000)	Habitat requirements (Barnes 2000; Hockey <i>et al</i> 2005; Harrison <i>et al</i> 1997; Young <i>et al</i> 2003; personal observations)
YELLOW-BILLED STORK <i>Mycteria ibis</i>	2628BB:7.4, 2628BD:2.7, 2628DB:8.7, 2629AC:4.1, 2629CA:4.0	near threatened	Always associated with water – dams, wetlands, rivers, marshes, even small pools. Could be present at larger water bodies e.g. Leeuwpan. Vulnerable to collisions.
PINK-BACKED PELICAN	2628BB:-, 2628BD:-, 2628DB:-, 2629AC:-, 2629CA:1.3	vulnerable	Always associated with large water bodies. Could be present at larger water bodies e.g. Leeuwpan. Vulnerable to collisions.
LANNER FALCON <i>Falco biarmicus</i>	2628BB:-, 2628BD:1.8, 2628DB:1.1, 2629AC:1.4, 2629CA:0.7	near threatened	Generally prefers open habitat, but exploits a wide range of habitats. Will nest in wooded areas if suitable cliffs are present. No negative interaction expected, except possible breeding on crow nests on the proposed lines.
WATTLED CRANE <i>Buggeranus carunculatus</i>	2628BB:-, 2628BD:-, 2628DB:1.1, 2629AC:-, 2629CA:-	critically endangered	Shallow wetlands with extensive short emergent vegetation. To a lesser degree in natural grassland and croplands. No suitable habitat along the alignment. Vagrant to the area.
BLUE KORHAAN <i>Eupodotis caerulescens</i>	2628BB:1.9, 2628BD:10.8, 2628DB:14.1, 2629AC:-, 2629CA:12.7	near threatened	Grasslands, pastures and cultivated fields. Vulnerable to collisions.
GREATER PAINTED SNIPE <i>Rostratula benghalensis</i>	Not recorded by Bird Atlas but recorded by CWAC	near threatened	Various aquatic habitats, preferring exposed mud adjacent to cover. Recorded at Leeuwpan. No interactions expected.
BLACK-WINGED PRATINCOLE <i>Glareola nordmanni</i>	2628BB:3.7, 2628BD:3.6, 2628DB:1.1, 2629AC:2.0, 2629CA:3.3	near threatened	Agricultural landscapes, ploughed lands. No interactions expected.

Species	Reporting rate %	Conservation status (Barnes 2000)	Habitat requirements (Barnes 2000; Hockey <i>et al</i> 2005; Harrison <i>et al</i> 1997; Young <i>et al</i> 2003; personal observations)
MELODIOUS LARK  Mirafr a cheniana	2628BB:-, 2628BD:- 2628DB:1.1, 2629AC:-, 2629CA:-	near threatened	Open climax Themeda grassland, pastures and fallow lands. Vulnerable to habitat destruction and disturbance.
BLACK STORK  Ciconia nigra	2628BB:-, 2628BD:-, 2628DB:, 2629AC:., 2629CA:1.3	near threatened	Associated with rivers, dams and cliffs. Could be present at larger water bodies e.g. Leeuwpan. Vulnerable to collisions.
SECRETARYBIRD  Sagittarius serpentarius	2628BB:5.6, 2628BD:6.3, 2628DB:10.9, 2629AC:6.1, 2629CA:7.3	near threatened	Prefer open grassland, densities low in maize growing areas. Was recorded during field visits in the study area. Vulnerable to collisions.
WHITE-BELLIED KORHAAN  Eupodotis senegalensis	2628BB:3.7, 2628BD:1.8, 2628DB:5.4, 2629AC:-, 2629CA:0.7	vulnerable	Often in the interface between grassland and savanna. Avoids severely grazed and recently burnt sites. Vulnerable to collisions.
LESSER FLAMINGO  Phoenicopterus minor	2628BB:0.9, 2628BD:0.9, 2628DB:5.4, 2629AC:0.7, 2629CA:7.3	near threatened	Moves extensively between water bodies. May be found in small numbers on any suitable dam. Vulnerable to collisions.
GREATER FLAMINGO  Phoenicopterus ruber	2628BB:2.8, 2628BD:2.7, 2628DB:21.7, 2629AC:5.4, 2629CA:17.3	near threatened	Moves extensively between water bodies. May be found in small numbers on any suitable dam. Vulnerable to collisions.
LESSER KESTREL  Falco naumanni	2628BB:11.1, 2628BD:9.9, 2628DB:8.7, 2629AC:10.2, 2629CA:10.0	vulnerable	No negative impacts expected from power line. Small and nimble species, likely to use the power line as hunting perch.
AFRICAN GRASS-OWL  Tyto capensis	2628BB:-, 2628BD:1.8, 2628DB:1.1, 2629AC:-, 2629CA:2.0	vulnerable	Likely to be found in rank grass adjacent to wetlands. Could be vulnerable to collisions with power line as potentially suitable habitat could exist in wetlands. Also vulnerable to habitat destruction.
BLUE CRANE  Anthropoides paradiseus	2628BB:0.9, 2628BD:14.4, 2628DB:39.1, 2629AC:-, 2629CA:3.3	vulnerable	Low reporting rate but can be present in the pockets of remaining grassland and wetlands. Vulnerable to collisions.
CASPIAN TERN  Sterna caspia	2628BB:-, 2628BD:-, 2628DB:3.3, 2629AC:1.4, 2629CA:1.3	near threatened	Estuaries and large inland water bodies. No negative interactions expected.

Species	Reporting rate %	Conservation status (Barnes 2000)	Habitat requirements (Barnes 2000; Hockey <i>et al</i> 2005; Harrison <i>et al</i> 1997; Young <i>et al</i> 2003; personal observations)
AFRICAN MARSH-HARRIER  Circus ranivorus	2628BB:0.9, 2628BD:9.9, 2628DB:-, 2629AC:2.7, 2629CA:1.3	vulnerable	Large permanent wetlands with dense reed beds. Sometimes forages in smaller wetlands and adjacent grassland. Could be vulnerable to collisions with power line as potentially suitable habitat could exist in wetlands. Also vulnerable to habitat destruction.
BLACK HARRIER  Circus maurus	2628BB:-, 2628BD:-, 2628DB:-, 2629AC:4.1, 2629CA:4.0	near threatened	Dry grassland and rarely in agricultural fields. Vulnerable to collisions with power lines.
PALLID HARRIER  Circus macrourus	2628BB:-, 2628BD:-, 2628DB:1.1, 2629AC:0.7, 2629CA:-	near threatened	Grasslands associated with open pans and floodplains. Vulnerable to collisions with power lines.
BOTHA'S LARK  Spizocorys fringillaris	2628BB:-, 2628BD:-, 2628DB:-, 2629AC:2.0, 2629CA:0.7	endangered	Prefers short grass, such as heavily grazed grassland in upland areas. No negative interactions expected. Vulnerable to habitat destruction and disturbance.
CHESTNUT-BANDED PLOVER  Charadrius pallidus	2628BB:2.8, 2628BD:-, 2628DB:-, 2629AC:-, 2629CA:-	near threatened	Found primarily in salt pans. No negative interactions expected.
DENHAM'S BUSTARD  Neotis denhami	2628BB:-, 2628BD:0.9, 2628DB:-, 2629AC:-, 2629CA:-	vulnerable	In the grassland biome it favours sour grassland in high rainfall areas. Vagrant to the area, no negative interactions expected.
SOUTHERN BALD IBIS  Geronticus calvus	2628BB:-, 2628BD:1.8, 2628DB:-, 2629AC:2.0, 2629CA:-	vulnerable	Likely to be found on recently burnt ground and unburnt, short-grazed grassland, cultivated pastures, reaped maize fields and ploughed lands. Vulnerable to collision with power lines.
GREY CROWNED CRANE  Balearica regulorum	2628BB:-, 2628BD:-, 2628DB:1.1, 2629AC:-, 2629CA:-	vulnerable	Breeds in marshes, pans, and dam margins with tall emergent vegetation. Feeds in adjacent short grasslands and croplands. Vulnerable to collision with power lines.

### **Power Line Interactions**

According to the Avifauna assessment the following interactions are prevalent in South Africa. Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds and other animals and birds colliding with power lines.

Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, and disturbance and habitat destruction during construction and maintenance activities.

According to the specialist report the most severe potential impact that the proposed line will have is bird collisions with the overhead earth wire. This impact will most likely occur close to wetlands, where the line skirts a dam, where it crosses a drainage line and in areas of natural grassland.

Species at risk are water birds of several species where it skirts larger dams, particularly Leeuwpan, where flamingo collisions have been recorded. Collision hazards also exist where the line will cross pockets of natural grassland, as this is the preferred habitat of most of the remaining large terrestrial Red Data species, including the Blue Crane, Blue Korhaan, White-bellied Korhaan and Secretarybird in the Mpumalanga highveld. As mentioned earlier, the impacts on grassland and wetlands that are evident in the study area have been severe, reducing most Red Data, large terrestrial species to vagrants. The dense grid of existing power lines that covers the whole study area is a death trap for cranes, and the impact of these lines on the remaining Blue Cranes in the area can only be guessed at. Large areas of what seems to be suitable grassland remain the study area, yet they are devoid of any cranes. Given the extreme vulnerability of cranes to power lines, there is no question that the power lines must have effectively sterilized large areas for these birds. There are, however, substantial numbers of non Red Data power line sensitive species in the study area that have managed to survive and even thrive in some instances despite the habitat degradation that have occurred. In some instances, man-made developments such as the proliferation of artificial water bodies have benefited certain species. Examples are Red-knobbed Coot, Reed Cormorant *Phalacrocorax africanus*, Egyptian Goose, White-breasted Cormorant *Phalacrocorax lucidus*, Black-headed Heron *Ardea melanocephala*, Grey Heron *Ardea cinerea* and Yellow-billed Duck (Harrison *et.al* 1997). These species (and many other non Red Data ducks, herons and waders) run the risk of collision with the proposed power lines.

During the site investigations several dead birds were found underneath the existing power lines that traverse over the study area. The birds included Blue Crane, Lesser Flamingo, Marsh Owl, Secretary Bird, Sacred Ibis and Feral Pigeon (refer to Figure 41).



FIGURE 41: DEAD BIRDS FOUND UNDERNEATH THE EXISTING POWER LINES ON SITE, LESSER FLAMINGO (LEFT) MARSH OWL (CENTRE) AND SECRETARY BIRD (RIGHT).

### **Preferred Alternative**

According to the specialist report, attached in Appendix 3, the most suitable power line alternative is Alternative 3. This is due to the avoidance of drainage areas and wetlands as well as the more developed nature of the route.

#### **7.1.10 Wetland and Riparian Zone Delineation**

##### Riparian Zones vs. Wetlands

##### **Wetlands**

The riparian zone and wetlands were delineated according to the Department of Water Affairs and Forestry (DWAF) guideline, 2003: A practical guideline procedure for the identification and delineation of wetlands and riparian zones. According to the DWAF guidelines a wetland is defined by the National Water Act as:

*“land which is transitional between terrestrial and aquatic systems where the water table is usually at or near surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”*

In addition the guidelines indicate that wetlands must have one or more of the following attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation;
- The presence, at least occasionally, of water loving plants (hydrophytes); and
- A high water table that results in saturation at or near surface, leading to anaerobic conditions developing in the top 50 centimetres of the soil.

During the site investigation the following indicators of potential wetlands were identified:

- Terrain unit indicator;
- Soil form Indicator;
- Soil wetness indicator; and
- Vegetation indicator.

### **Riparian Areas**

According to the DWAF guidelines a *riparian area* is defined by the National Water Act as:

“Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas”

### **The difference between Riparian Areas and Wetlands**

According to the DWAF guidelines the difference between a wetland and a riparian area is:

“Many riparian areas display wetland indicators and should be classified as wetlands. However, other riparian areas are not saturated long enough or often enough to develop wetland characteristics, but also perform a number of important functions, which need to be safeguarded. Riparian areas commonly reflect the high-energy conditions associated with the water flowing in a water channel, whereas wetlands display more diffuse flow and are lower energy environments.”

### **Delineation**

The site was investigated for the occurrence of wetlands and riparian areas, using the methodology described above and described in more detail in the DWAF guidelines.

### **Terrain Unit Indicator**

The terrain on site varies from 1480 mamsl to 1760 mamsl as illustrated in Figure 12. From Figure 12 it can be seen that the site is located in an area of undulating hills with the dominant terrain units on site being the midslope, footslope and valley bottom units. According to the DWAF guidelines the valley bottom is the terrain unit where wetlands are most likely to occur, but they are not excluded from any of the other terrain units.

### **Soil Form Indicator**

The soils on site follow a strong correlation with the underlying geology. The Sandstone soils are generally sandy, deep soils that are good for agriculture, while the Dolerite soils are dark in colour and have a high clay content. These soils are less suitable for agriculture and are mostly used for grazing.

The soils are located on the rolling landscape described above that slopes to the numerous streams and rivers in the area. Water enters the soils profile and then flows through the profile down-slope. This action of water movement through the slope typifies a small section of the site (eluvial and plinthic soils). Closer to the streams (within the valley bottom terrain unit) the soils gradually deepen due to the down-slope transport of soil (colluvium). In addition these soils have gradually higher percentages of clays that over time have been washed down-slope and accumulate at the valley bottom where the slope angle reduces.

During the site visits the soils on site were identified (Refer to Section 7.1.5). Of the soils identified on site the Katspruit, Rensburg and Willowbrook soil forms are indicative of the permanent wetland zone, while the Kroonstad, Wasbank, Westleigh, Avalon, Inhoek and Longlands soil forms are indicative of the temporary or seasonal wetland zone.

### **Soil Wetness Indicator**

The soils on site were subjected to a soil wetness assessment. If soils showed signs of wetness within 50 cm of the soil surface, it was classified as a hydromorphic soil and divided into the following groups:

#### Temporary Zone

- Minimal grey matrix (<10%);
- Few high chroma mottles; and
- Short periods of saturation.

#### Seasonal Zone

- Grey matrix (>10%);
- Many low chroma mottles present; and
- Significant periods of wetness (>3 months / annum).

#### Permanent Zone

- Prominent grey matrix;
- Few to no high chroma mottles;
- Wetness all year round; and
- Sulphuric odour.

The soils mentioned above were classified accordingly and the results are visually represented in Figure 13 and Figure 14.

### Vegetation Indicator

The vegetation units on site are described in Section 7.1.8 above and illustrated in Figure 38. The vegetation found in the moist grassland and the seepage zone vegetation units both have species present to indicate the presence of wetlands.

### Wetlands and Buffer Zones

According to the methodology that was followed for delineation of wetlands by DWAF, there are wetlands on site. It should however be noted that several of the so-called wetlands could also be classified as riparian zones as they follow drainage paths of the streams on site.

All the areas identified above perform critical ecosystem functions and also provide habitat for sensitive species. It is suggested that a 100 m buffer be placed from the edge of the wetland and riparian zones in order to sufficiently protect these zones. Figure 42 and Figure 43 below illustrates the various wetland zones including the buffers. From the figures it is once again clear that Alternative 3 is the best alignment, as it limits the interaction with the sensitive wetlands.

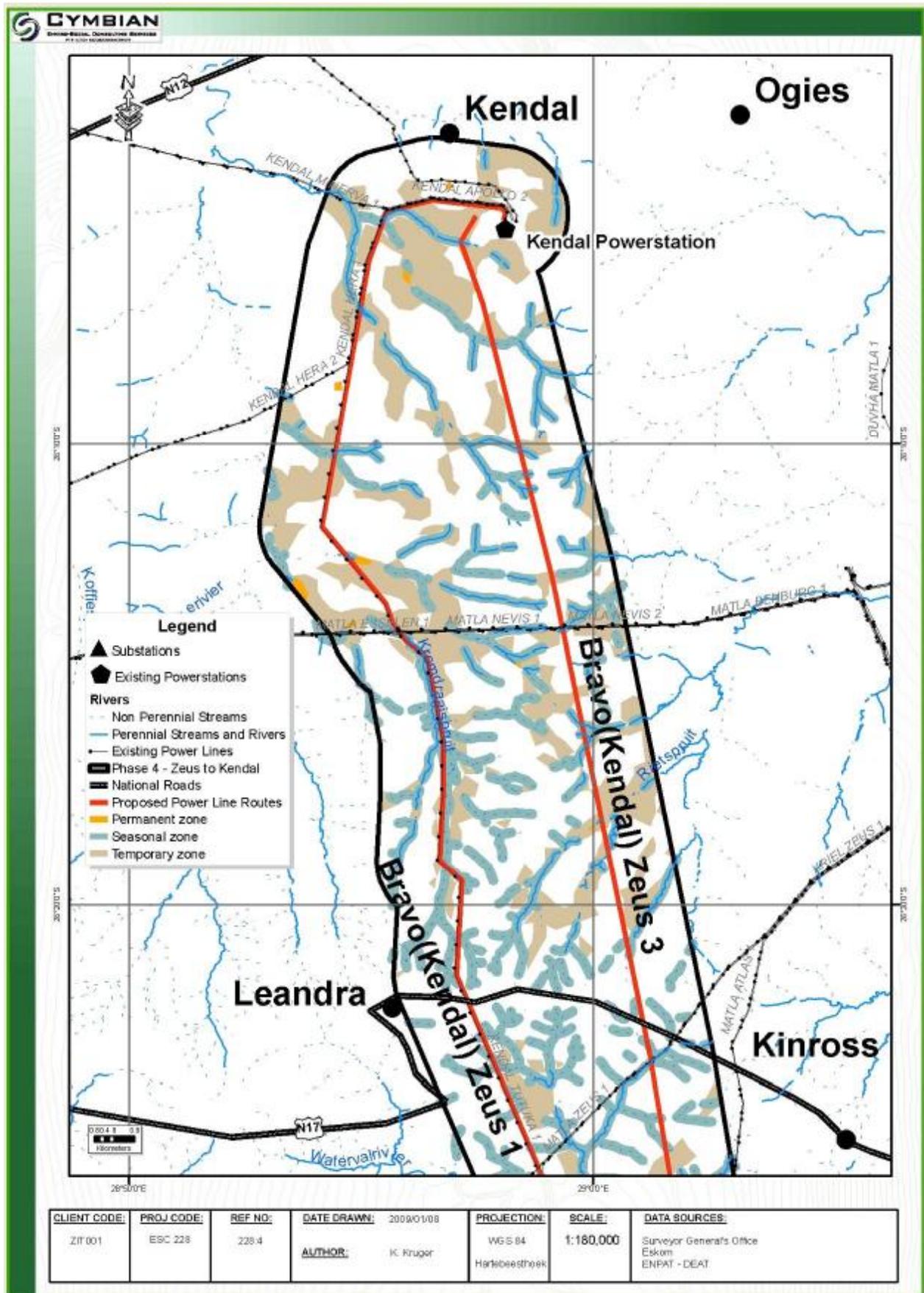


FIGURE 42: WETLAND AND RIPARIAN ZONE MAP OF THE NORTHERN SECTION OF THE SITE

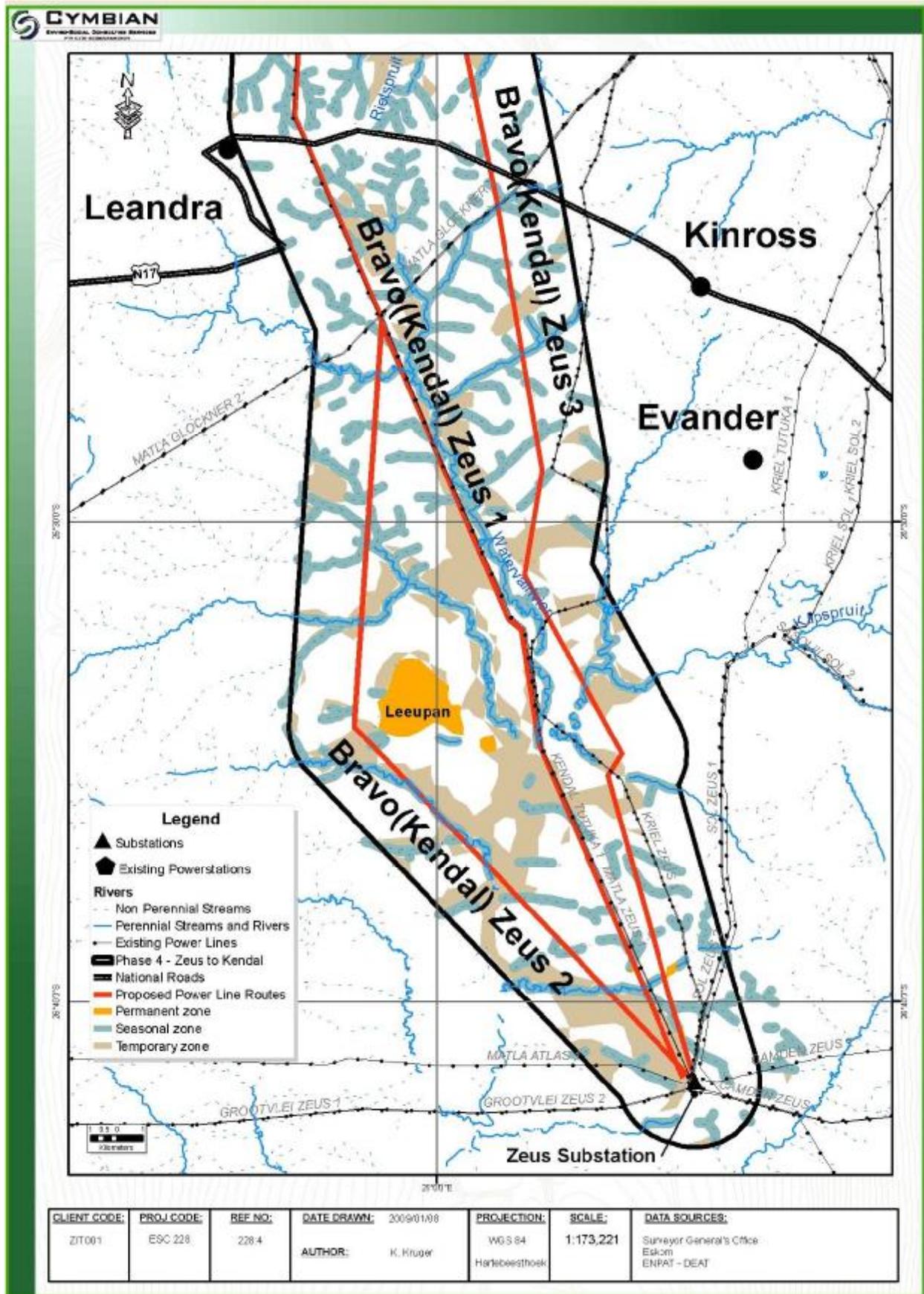


FIGURE 43: WETLAND AND RIPARIAN ZONE MAP OF THE SOUTHERN SECTION OF THE SITE

### 7.1.11 Biodiversity Rating

The following vegetation units were identified on site:

- Antropogenic grassland;
- Moist grassland;
- Grazed grassland; and
- Seepage areas and wetlands.

Each of the abovementioned vegetation units are rated for their biodiversity value below.

#### Grazed Grassland

This vegetation unit has a moderate biodiversity rating as indicated in Table 14 below. The moderate conservation value is attributed to the moderate grassland species diversity in the unit and the large area of rocky grassland remaining. The high functional rating is attributed to the obvious ecological services and the high aesthetic value of the rocky grassland.

**TABLE 14: BIODIVERSITY RATING FOR THE GRAZED GRASSLAND UNIT**

Conservation status	Size of vegetation unit	Species diversity	Condition
	3 – Moderate	3 - Moderate	3 – Moderately Disturbed
Functional status	Use	Ecological service	Aesthetic value
	3 – Periodic	5 – Obvious	5 - High
Biodiversity Rating	Conservation status	Functional status	Biodiversity
	9 – Moderate	13 - High	Moderate

#### Moist Grassland

This vegetation unit has a **moderate** biodiversity rating as indicated in Table 15 below. The **moderate** conservation value is attributed to the moderate grassland species diversity in the unit and the moderate area of moist grassland remaining. The **high** functional rating is attributed to the obvious ecological services and the high aesthetic value of the moist grassland.

**TABLE 15: BIODIVERSITY RATING FOR THE MOIST GRASSLAND UNIT**

Conservation status	Size of vegetation unit	Species diversity	Condition
	3 – Moderate	3 – Moderately Disturbed	3 – Moderately Disturbed
Functional status	Use	Ecological service	Aesthetic value
	1 – none	5 – Obvious	5 - High
Biodiversity Rating	Conservation status	Functional status	Biodiversity
	9 - Moderate	11 - High	Moderate