# 3. OVERVIEW OF THE STUDY AREA

## 3.1. Location of the Study Area

The study area falls within the Bojanala Platinum District Municipality of the North West Province, with Rustenburg as the closest main town. The boundaries of the study area are defined by the existing Matimba-Midas No 2 400 kV Transmission line to the west and south, the Pilanesberg mountain to the north and the Spitskop-Bighorn 400 kV Transmission line to the east (refer to Figure 3.1).

## 3.2. Climate and Atmospheric Conditions

The study area falls within the boundary between two climatic regions, namely Region H ("Highveld") and Region NT ("North Transvaal"). This area, therefore, shares some characteristics of both climatic regions.

### *3.2.1. N-Value*

The "Weinert N-Value", that describes the climatic environment, is approximately 3 for the area. Where "N" is more than "5", disintegration is the prominent form of weathering, and where "N" is less than "5", decomposition affects those rocks whose minerals are liable to change chemically under atmospheric conditions (Grové, 2002).

### *3.2.2. Precipitation*

Rainfall occurs throughout the year, but predominantly between November and March, mainly as a result of thunderstorms. Annual rainfall averages approximately 650 mm. The wettest month of the year is January, with an average monthly total rainfall of 132 mm. The driest month is July, with an average monthly total rainfall of 2 mm (Weather Bureau, 1997).

### *3.2.3. Temperature*

Mean annual air temperatures range from 11,8°C in June/July to 23,8°C in January. Average daily maxima range from 20,4°C to 30,3°C, and minima from 2,8°C to 17,2°C (Weather Bureau, 1997).

### *3.2.4. Wind Flow Patterns*

Winds are mainly light to moderate and blow from the north-easterly sector, except for short periods during thunderstorms or weather changes when they have a southerly component (Weather Bureau, 1997). Wind roses for 1995 are provided in Figure 3.1 overleaf.

A clear distinction can be made between the day and night-time wind conditions. Night-times are characterised by an increase in the number of calms as is typical of the night-time flow regime in most regions, and by the predominance of low velocity wind (generally below 3 m/s) from the south-westerly, southern and south-easterly sectors. Calm wind conditions occur nearly twice as much during the night than daytime hours. Furthermore, the winds during the day are mainly from the north-western, northern and north-eastern sectors.

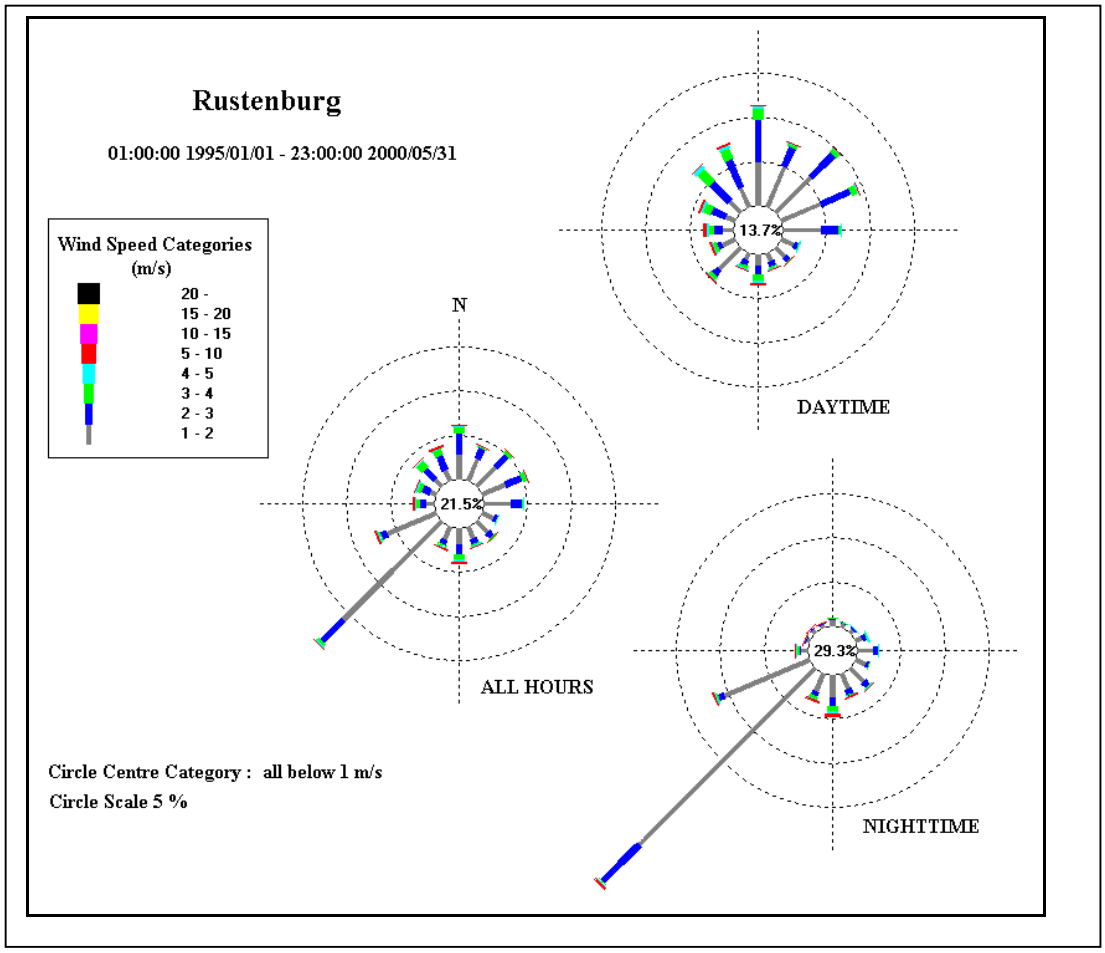


**Figure 3.1:** Wind patterns recorded at the Rustenburg Weather Station (1995)

There is also a peculiar prevalence of south-westerly winds that dominates the night-time conditions. This may be due to nocturnal (katabatic) air drainage winds from the Magaliesberg Mountain range, located towards the south-west and west of Rustenburg.

During the daytime, winds from the south-eastern sector are replaced by airflow with northerly and westerly components. Strong northerly, and westerly to north-westerly wind predominates. Increased wind velocities are noted for daytime hours, with wind velocities in excess of 5 m/s occurring relatively frequently.

### *3.2.5. Lightening*

The Lightening Ground Flash Density in the study area is between 5 to 7 strikes/km$^2$/year on a scale of 0 to 19 (2001 Eskom's LPATS system; Clara, 2001; refer to Figure 3.2 overleaf).

### *3.2.6. Air Pollution Levels within the Rustenburg Area*

In characterising the current air quality of the study area, readily available observational data needs to be reviewed. Observational data is, however, limited to five months of respirable particulate concentrations recorded within the Magalies Moot area during 1995. A number of privately-owned (i.e. mine-owned) air quality-monitoring networks operate in the Rustenburg area, but their main focus is on sulphur dioxide. The most relevant monitoring data are those collected by the network operated by RPM Waterval Smelter. Unfortunately, this network only considers sulphur dioxide and limited particulate matter (Burger, *et al.,* 2000).

- *Measured Sulphur Dioxide and Particulate Concentration Levels:*
  Ambient sulphur dioxide measurements have been undertaken in the Rustenburg region since July 1995. Ambient particulate concentration measurements have also been made within the town of Rustenburg. The highest recorded daily and monthly average air sulphur dioxide concentrations are summarised in Table 3.1 below (Burger, *et al.,* 2000).

**Table 3.1:** Highest daily and monthly average sulphur dioxide concentrations for monitoring stations near Rustenburg

| Monitoring Station | Year | Sulphur Dioxide (ppb) | |
|---|---|---|---|
| | | Highest Daily Average | Highest Monthly Average |
| Site 2 – Rex Farm | 1995 – 1996 | 36 | 18 |
| Site 3 – Brakspruit Shaft | 1995 – 1996 | 49 | 18 |
| Site 4 – Hoërskool Bergsig | 1996 – 1999 | 232 | 52 |

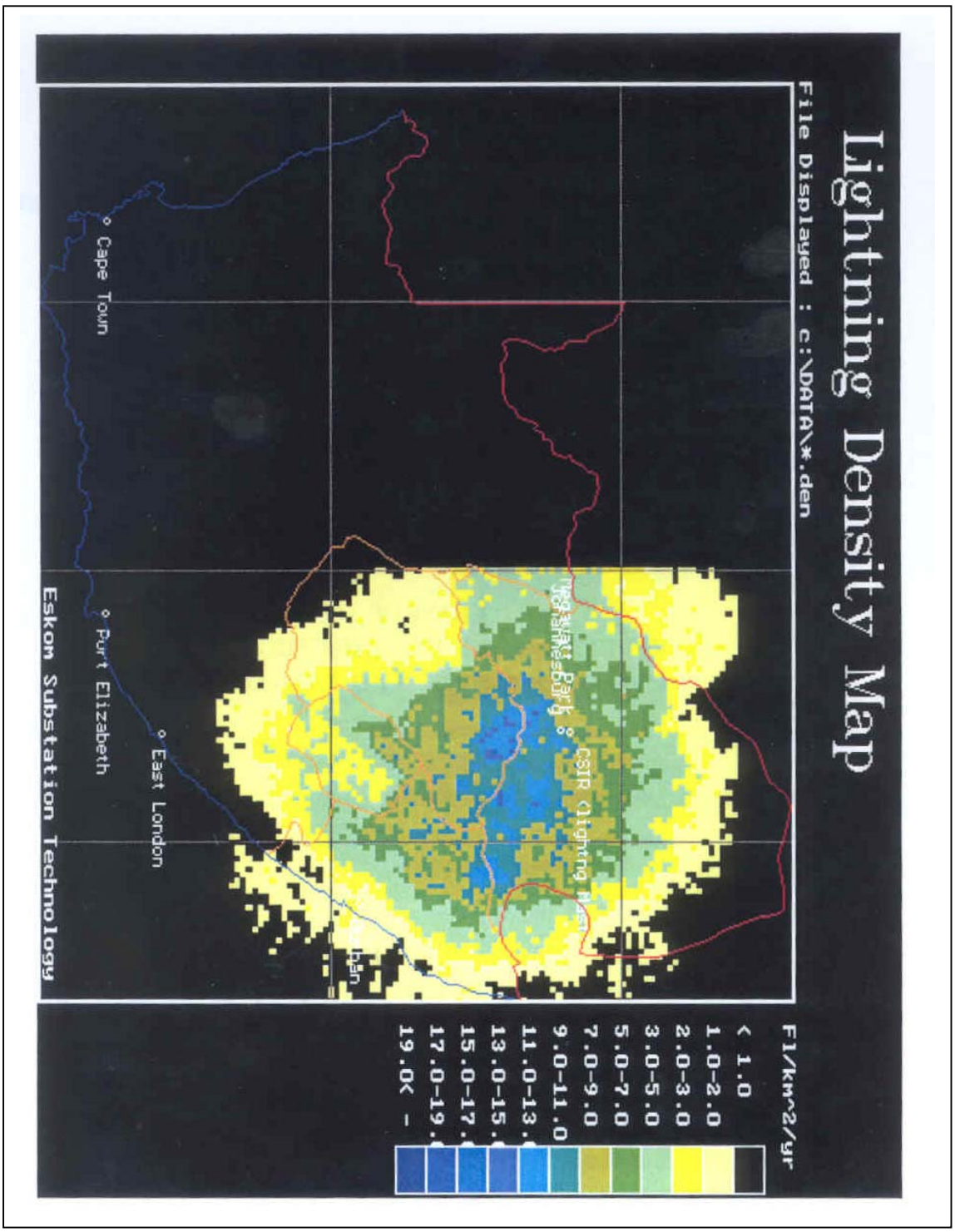


**Figure 3.2:** Lightening density for South Africa (1994 – 2000; Clara, 2001)

- *Fine Particulate Concentrations:*

  The highest hourly mean fine particulate matter (PM10) concentrations measured within the town of Rustenburg (1995 and 1996) ranged between 500 μg/m$^3$ and 470 μg/m$^3$. The highest daily average concentrations were between 75 μg/m$^3$ and 95 μg/m$^3$ (Burger, *et al.,* 2000).

  The simulations of particulates from industrial sources predicted highest daily average concentrations of approximately 25 μg/m$^3$ and annual average predictions of approximately 5 μg/m$^3$ in the Rustenburg area (Burger and Scorgie, 2000).

## 3.3. Topography

The landscape to the north-west and south-west of the study area is dominated by mountainous and hilly terrain, and includes the Magaliesberg and Pilanesberg mountain ranges, as well as a second range of smaller hills parallel and to the north of the Magaliesberg. The elevation (above mean sea level; amsl) of the high-lying areas varies between 1 200 m and 1 700 m. The flatter terrain beyond these high lying areas averages between 1 050 m amsl and 1 180 m amsl (refer to Figure 1.1). The topography to the north, west and east of the study area is dominated by well-established non-perennial watercourses (including the Elands, Selons and Sterkstroom rivers) where the altitude drops to less than 1 000 m amsl (refer to Figure 1.1). The central part of study area is characterised by the sporadic presence of hillocks and rocky outcrops.

## 3.4. Surface Water

The major rivers in the study area include the Selons River in the west flowing southwards, the Elands River in the north, the Sterkstroom River in the east and the Hex River in the central portion of the study area. The Bospoort Dam occurs on the Hex River approximately 12 km north-east of Rustenburg.

Smaller watercourses of importance include the Sandspruit in the north (tributary of the Elands River) and streams, canals and furrows in the vicinity of the proposed Ikaros Substation site.

## 3.5. Geology and Soils

The low-lying areas of the Rustenburg region consist mainly of shallow layers of residual clay soils overlying the same residual rocks (Gabbro-norite), and mostly hard rock towards the Elands River. East of the Elands River, sandy silts of varying depth overlay the residual rocks.

The Magaliesberg Mountain range consists predominantly of quartzite, and a parallel range of hills to the north consists of granite. East of these hills, red sandy soils of varying shallow depths overly residual rocks (i.e. norite-anorthosite and Pyroxenite). Over the hills, the rocks are quartzite and norite hybrid rock. West of the hills, red sandy soil layers of varying depths cover shales and diabase dykes (Clara, 2001).

The geology of the broader area identified for the establishment of the Ikaros Substation comprises Pyramid Gabbro/Norite of the Rustenburg Layered Suite of the Bushveld Igneous Complex. The Norite is blanketed to varying thickness (from ± 0,2 m to > 4,5 m) by residual soils, which have developed as a weathering product from the norite rock. Rocky outcrops were recorded randomly in the area (Grové, 2002).

### 3.6. Flora

The study area comprises three vegetation types:

- *Clay Thorn Bushveld/Other Turf Thornveld*:
  This veld type occurs on the black vertic clay soils of the flat plains of the North West and Northern Provinces. *Acacia tortilis, Acacia karroo* and *Acacia nilotica* dominate the tree layer within this vegetation type. The Clay Thorn Bushveld is the main veld type (80%) found within the study area, with 60-70% of this veld type currently being cultivated (rural and/or commercial agriculture), or in various stages of recovery from cultivation (known as old lands) being colonised by a pioneer grass sward and associated shrubs and forbs. The areas not cultivated appear to be those where the water table is very low due to bad drainage (versuiplande), or where the soil is too shallow to cultivate.

  At most of the survey sites within the study area, *Bothriochloa insculpta* and various *Aristida* species are common and, in some places, even dominate the grass sward. This is a clear indication of degradation due to over-utilisation. Bad management practices, such as an incorrect fire regime (e.g. frequent fires during the wrong season and under bad weather conditions) has contributed to this state of degradation.

- *Mixed Bushveld:*
  This veld type is very variable depending on soil type, soil depth and aspect, and is represented by many different plant communities and habitat types. It occurs mainly on the undulating to flat plains of the Northern and North West Provinces. The soil is mostly shallow, sandy, sometimes coarse and gravelly, overlying granite, quartzite, sandstone or shale.

The vegetation may vary from short, dense, sometimes shrubby bushveld to tall, open tree savanna. Mixed Bushveld occurs in approximately 25% of the study area, of which approximately 30% is cultivated (the areas with deep soils) and represent a small portion (approximately 15%) of the total study area. The areas utilised for grazing display various degrees of degradation (highly degraded, fair, good or excellent), depending on the stocking rates and level of farm management. Serious donga and sheet erosion is evident to the west of the Magaliesberg. Various instances of bush encroachment were also recorded along the route, with *Dichrostachys cinerea* and *Acacia tortilis* the main encroacher species.

- *Waterberg Moist Mountain Bushveld/Sour Bushveld*:
  This veld type occurs on the Sandstone and quartzite of the Magaliesberg, north-west of Rustenburg, while similar vegetation can be found on the slopes and crests of the norite hill complex, east of the proposed Ikaros Substation site. The soils are acidic, sandy, loamy to gravelly (Low and Rebelo, 1996).

  The vegetation may vary considerably according to local soil conditions, while aspect and rockiness may also play a mayor role in species composition. This veld type represents a small portion of the study area (approximately 5%). Along the Magaliesberg it is fairly well conserved (approximately 8,5%) in the Magaliesberg Protected Natural Environment (PNE; Low & Rebelo, 1996).

  This veld type is currently under threat of serious damage in the norite hill complex east and north-east of the proposed Ikaros Substation site (Boschpoort/Beestkraal area). Complete hills are being mined, resulting in the disturbance of the ecological functioning of the whole norite hill complex. Rehabilitation efforts appear either non-existent, or superficial and wholly inadequate. To prevent the total loss of this natural site, urgent steps will have to be taken by the relevant authorities to curb the destruction due to quarrying.

A total of 189 species were recorded during the survey. The plant species recorded at the various sites were combined in a single species list (refer to Appendix I). Functional growth forms were allocated to each species using the following classes:

- *Woody species:*
  - Trees - woody, single stemmed, taller than 2 m or multi-stemmed and taller than 5 m.
  - Shrubs - woody, single or multi stemmed, taller than 1meter and shorter than 2 m.
  - Dwarf shrubs - woody, single or multi stemmed, shorter than 1 m.

- Grasses - all representatives of the Poaceae, Restionaceae and Cyperaceae
- Forbs - Non-woody, annuals and perennials, climbers & creepers, geophytes and ferns

In terms of the above-mentioned growth form and structure classes, the species diversity can be described as follows:

- Sedges (1%) - 2 indigenous species recorded, no alien species.
- Grasses (22%) - 41 indigenous species recorded, no alien species.
- Forbs or herbs (38%) - 64 indigenous species and 8 alien species recorded.
- Dwarf shrubs, shrubs & trees (39%) - 73 indigenous and 1 alien species recorded.
- Alien species (5%) - 9 species recorded (this represent the alien species found within the natural vegetation only - the real proportion of alien species is probably much higher since the old lands, disturbed areas, etc. were not surveyed).

### *3.6.1. Red Data Species*

The Red Data list indicates the ecological and conservation status of indigenous flora, and is currently widely used by authorities to regulate development in natural areas. In the North West Province, the Red Data list is given legal status by inclusion in the Transvaal Nature Conservation Ordinance No. 12 of 1983 through AN 164, 3 February 1984:

- Annexure I - Endangered and Rare Species of Fauna and Flora (Section 97 (1) (A)), and
- Annexure II - Rare Species of Fauna and Flora (Section 97 (1) (B)) (Flora on the CITES list)

The relevant authorities within the North West Province could not provide a list of Red Data species which may occur within the study area. Therefore, the PRECIS database of the National Botanical Institute (NBI) in Pretoria was searched, and a list including ten possible Red Data species was compiled according to previous records of occurrence.

The possibility of occurrence of the listed species within the study area was evaluated according to the following criteria:

- specific habitat requirements of identified species; and
- the likelihood of occurrence according to the known natural distribution of the species. For this purpose, a search for distribution records of the species on the list was done on the PRECIS database (National Herbarium Pretoria, PRE).

The results of the evaluation are provided in Table 3.2 below.

**Table 3.2:** Red Data species that occur or may occur within the study area

| Red Data Plant Species | Status | Likelihood of occurrence according to habitat preferences | | |
|---|---|---|---|---|
| | | Black Norite Turf | Magaliesberg crest/slopes | Norite hill complex |
| *Asclepias fallax* | R | Likely | Possible | Possible |
| *Asclepias eminens* | R | Likely | Possible | Possible |
| *Aloe peglerae* | R | Highly unlikely | Highly Likely | Possible |
| *Frithia pulchra* | R | Highly unlikely | Highly Likely | Likely |
| *Nuxia glomerulata* | R | Highly unlikely | Highly Likely | Likely |
| *Rhynchosia nitens* | K | Possible | Recorded | Recorded |
| *Eucomis autumnalis* | K | Possible | Likely | Likely |
| *Delosperma leendertziae* | K | Highly unlikely | Likely | Likely |
| *Tristachya biseriata* | K | Highly unlikely | Likely | Likely |
| *Erythrophysa biseriata* | R | Highly unlikely | Possible | Highly Likely |

R – Rare; K – Insufficiently known

Only one of the plant species recorded and listed in Appendix I (i.e. *Rhyncosia nitens*) is found in the "Red Data List of southern African plants" (Craig Hilton-Taylor, 1996). There is, however, a distinct possibility that other Red Data species may be found. The main reasons for not finding these species during the study may be amongst others:

- The absence of specific microhabitats for the specific species.
- The replacement of these species through time by pioneer species and/or increaser grass species due to species composition changes caused by prolonged human activity (e.g. trampling, refuse dumping, etc.) and/or agricultural practices (e.g. burning and grazing regimes, etc.).
- Low frequency of endangered species occurrence prevented recording.
- The growth habit of certain species (geophytes) make them very difficult to locate, while several species only flower during very specific conditions e.g. directly after a veld fire.
- Wrong time of the year for flowering. This however, seems unlikely as the study area was visited on various occasions during December 2001 and March 2002, covering the flowering season of almost all the species listed.

A few scattered specimens of *Rhynchosia nitens* were found within the Norite hill complex, while several specimens were observed on the foot and mid-slopes of the eastern slopes of the Magaliesberg. This status of this species is given as insufficiently known. Further investigation on the frequency of occurrence and distribution range of this species (i.e. within the four northern

provinces) might prove this species as being of a low priority as it seems to be widespread and fairly common within certain areas.

If the diversity in potential microhabitats along the Magaliesberg, as well as the norite hills (Boschkop area) is taken into account, several other Red Data plant species may also occur along the proposed routes.

The species with a high possibility of occurrence along the Magaliesberg include *Aloe peglerae, Frithia pulchra* and *Nuxia glomerulata*:

- *Aloe peglerae* - Restricted to the steep, rocky, northern slopes and summit of the Magaliesberg. This species is listed rare and is endangered mainly due to destruction of its habitat because of urban development while illegal removal by plant collectors also play an important role. All the conditions for its occurrence exist along the southern route. Although it is reasonably conserved within the Magaliesberg conservation area, this species remain highly vulnerable.
- *Frithia pulchra* - Another species restricted to the Magaliesberg. *F. pulchra* is a small stemless succulent, which occurs in shallow soil pockets amongst the rocks and coarse gravel soils of the Magaliesberg summit. Due to its limited distribution this species is also regarded as rare and highly vulnerable.
- *Nuxia glomerulata* - A small tree or shrub occurring on open hillsides, rocky western slopes and/or deep rocky ravines. It has a fairly large distribution range and occurs fairly widespread within Gauteng, Northern Province (south of Pietersburg) and the North West Province. This species is listed as rare and remain vulnerable due to habitat destruction.

Another species that may occur within the southern corridor is *Erythrophysa transvaalensis.* This species is restricted to the North West Province, predominantly to the Norite hill complex, and possibly the Pilanesberg. The Norite hill complex (east of the proposed Ikaros Substation site on the Boschpoort and Beestkraal farms) is regarded as its centre of distribution (Prof. B. van Wyk, 2002, *pers. comm.*).

### 3.7. Terrestrial Fauna

Few large wild animals occur naturally in the study area, largely due to the disturbance of natural habitats as a result of mining and agricultural activities. The smaller mammals and rodents, as well as a number of bird species, however, can still be expected to occur in these disturbed areas.

The Magaliesberg range is located within the study area, and is largely undisturbed. This range marks the boundary between two vastly different veld types (i.e. bushveld and highveld southern grassland), and represents the limit of distribution of many mammals which are associated with these habitats (Carruthers, 1990). Therefore, it is possible that some wild fauna species may be found in this section of the study area.

## 3.8. Avi-fauna

Vegetation type is one of the most important factors influencing bird distribution (Harrison *et. al,* 1997), as it directly influences the species composition, abundance and range. The majority of the vegetation within the study area has been radically altered in many areas, primarily by mining activity and human settlement. The area has a high population of people and livestock, which has benefited some bird species, particularly the scavengers, but negatively impacted upon others, especially certain terrestrial species that have not been recorded in the area in recent times. The destruction of vegetation through overgrazing, disturbance by mining operations and hunting pressure are the most likely reasons why species such as Kori Bustard do not occur in the area any longer. Conversely, species such as the Pied Crow has benefited greatly from the humans settlements and has become super-abundant in certain areas.

In addition, the construction of permanent dams and waterbodies in the study area (e.g. the Bospoort Dam and the Olifantshoek Dam) has led to an increase in waterbirds, with species now occurring throughout the year that historically only occurred seasonally at ephemeral waterbodies.

A list of bird species which may occur in the study area is included within Appendix J.

## 3.9. District Municipal Structure within the Study Area

### *3.9.1. Bojanala Platinum District Municipality*

The study area is located in the area of jurisdiction of the Bojanala Platinum District Municipality (DC37). The district municipality is one of four district municipalities of the North West Province.

The Bojanala Platinum District Municipality consists of the two former district council areas, namely:

- the former Rustenburg District Council; and
- the former Eastern District Council.

In this regard it is important to note that some of the planning policies and Town Planning Schemes of the previous district councils are still applicable to areas within the Bojanala Platinum District Municipality. No consolidated town planning instruments have been developed for the new municipal structures. The municipal structure of the North West Province is illustrated in Figure 3.3.

### *3.9.2. Locational Context*

Bojanala Platinum District Municipality (DC37) is located in the north-eastern extreme of North West Province. Bojanala is boundered by the Northern Province on the northern boundary, Gauteng Province on the eastern boundary, the Southern District Municipality (DC40) on the southern boundary and Central District Municipality (DC38) on the western boundary. The locational context of the proposed corridors is illustrated on Figure 3.4.

## 3.10. Local Municipal Structures within the Study Area

### *3.10.1. Bojanala Platinum District Municipality*

Bojanala Platinum District Municipality consists of five local municipalities namely:

- Rustenburg Local Municipality
- Madibeng Local Municipality
- Moretele Local Municipality
- Ketleng Rivier Local Municipality
- Moses Kotane Local Municipality

Although certain of the proposed alternate corridors affect a limited number of properties located within the areas of jurisdiction of Kgetleng Rivier Local Municipality and Moses Kotane Local Municipality, the majority of the properties affected by the proposed corridors fall within the jurisdiction of the Rustenburg Local Municipality. It is, therefore, anticipated that the Rustenburg Local Municipality will experience the biggest potential impact of the proposed Transmission lines.

**Figure 3.3:** Rustenburg District Council: IDP

**Figure 3.4:** Locational context map

### *3.10.2. Areas Affected by Town Planning Schemes*

The Rustenburg Local Municipality was established during 2001 and is an authorised local authority in terms of the provisions of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986). It is, therefore, in a position to take final decisions in respect of applications for amended or new land use rights within its area of jurisdiction.

Applications for changes in land use rights in urban areas (proclaimed townships) are dealt with in terms of the Rustenburg Town Planning Scheme, 2000. Applications for rural areas and changes to agricultural uses are dealt with in terms of the Rustenburg District Council Town Planning Scheme, 2000. The Rustenburg District Town Planning Scheme is, therefore, applicable to all registered farm portions within the Bojanala Platinum District Municipality area.

The areas of influence of the statutory town planning schemes are schematically illustrated on Figure 3.5.

## 3.11. Planning Policy and Guideline Documents

### *3.11.1. Integrated Development Plans at District Level*

Integrated Development Planning is a process through which municipalities prepare strategic development plans for a 5 year period. The Integrated Development Plan (IDP) is a principle strategic planning instrument that aims to guide and inform all planning, budgeting, management and decision making in a municipality.

The latest approved IDP, on district level for the area under consideration, is the Rustenburg District Council Integrated Development Plan and Land Development Objectives.

The Bojanala Platinum District Municipality encompasses the former Rustenburg District Council and Eastern District Council and the above-mentioned IDP will, therefore, still be applicable to the study area.

### *3.11.2. Integrated Development Planning at Local Level*

The Rustenburg Local Municipality had already finalised the Local Municipality Integrated Development Planning Process as at the date of this report.

**Figure 3.5:** Statutory town planning scheme areas

This IDP (Rustenburg Local Municipality Draft IDP) was largely used for the purposes of this report, as the proposed development of the Ikaros Substation and associated 400 kV Transmission line infrastructure is largely concentrated within the area of jurisdiction of the Rustenburg Local Municipality.

The planning documents consulted during the investigation include:

- the Rustenburg District Council Integrated Development Plan and Land Development Objectives (June 2000);
- the Settlement Strategy Document (June 1996);
- the Rustenburg Local Municipality Draft Integrated Development Plan and Land Development Objectives (March 2002); and
- the Kgetleng Rivier Analysis document (March 2002).

Although some of the above-mentioned documents had not been officially approved as at the date of this report, such documents were deemed to provide sufficient information in respect of planning proposals and policies for the purpose of the investigation. The local authority officials confirmed that no substantial changes were foreseen before official approval by the relevant authorities.

### *3.11.3. Rustenburg District Council Integrated Development Plan/Land Development Objectives, 2000*

- *Spatial framework:*

  As previously mentioned, the Rustenburg District Council IDP is still being used as an instrument to guide and inform all planning, budgeting, management and decision-making on a district level in the study area. The Rustenburg District IDP serves both the purpose of *"land development objectives*" and an "*integrated development plan*" for the former Rustenburg District Council Area.

  The Spatial Framework of the IDP identified certain informal settlements and mining areas at a district level, as indicated on the extract on Figure 3.6. From Figure 3.6 it is clear that some mining areas and informal settlements will potentially be affected by the proposed corridor alternatives.

- *Guiding Principles:*

  The Rustenburg District Council IDP includes a regional spatial development framework to provide the spatial background to guide development and development initiatives in the Rustenburg District Council area. It is strategic in nature and serves to guide and direct the decision-making process, rather than to govern and regulate land use development. However, where IDPs and Land Development Objectives (LDOs) have been officially approved by the appropriate authorities, the relevant legislation provides that no land use related decisions of any authority may be implemented where such decisions are deemed to be inconsistent with the provisions of the IDP or LDOs. It is, therefore, important to assess the proposed development of the powerlines and substation against the background of what is proposed by the IDP and the regional spatial development framework.

  The spatial development framework divides the area into a number of functional precincts/categories - each based on a very distinct function the area plays in the context of the Rustenburg District Council. The areas can be summarised as follows:

  * Extensive agriculture
  * Conservation area: commercial
  * Conservation area: tribal
  * Community farming area
  * Urbanisation area
  * Primary activity area
  * Secondary activity area
  * Regional service delivery centres

  The above-mentioned functional areas are illustrated on the Regional Spatial Development Framework on Figure 3.6. The proposed Transmission line corridors traverse certain functional precincts, most notably:

  * Urbanisation area (towns and settlements)
  * Community farming area
  * Extensive Agriculture
  * Primary activity areas (mining)

**Figure 3.6:** RDC: Regional Spatial Development Framework

Although the areas affected by the proposed Ikaros Substation site and associated 400 kV Transmission line corridor are not specifically earmarked for the purpose of electrical infrastructure in the above-mentioned framework, it is confirmed that infrastructure is usually not indicated on such plans. The scale and nature of a Spatial Development Framework (at district level) precluded the possibility of indicting detailed infrastructure as part of the broader land use categorisation.

It may, therefore, be concluded that the proposed Ikaros Substation and associated 400 kV Transmission line infrastructures can, in terms of the LDO / IDP development framework proposals at district level, be deemed to be generally consistent with the provisions governing land use.

### *3.11.4. Rustenburg Local Municipality Integrated Development Plan, 2002*

The Rustenburg Local Municipality IDP focuses in more detail on the study area as the largest portion of the area affected by the proposed powerline corridors, as well as the proposed Ikaros Substation site, fall within the area of jurisdiction of the Rustenburg Local Municipality.

The above-mentioned IDP identified mining, towns and certain settlements, and agriculture as the dominant land use precincts along the routing of the proposed corridors, including the proposed Ikaros Substation site namely:

- Mining belts;
- Towns;
- Settlements; and
- Agriculture.

Figure 3.7 is an extract from the Rustenburg Local Municipality IDP and indicates informal settlements and mining areas as identified in the IDP. It is evident from Figure 3.7 that the region is dominated by two major form-giving elements namely:

- The Magaliesberg mountain range; and
- the Platinum Group Metals Installation (Merensky ridge) to the north of the mountain range.

**Figure 3.7:** Rustenburg Local Municipality: Land Use

The proposed corridors generally pass over mining land (managed by different stakeholders), formal and certain informal settlements and larger tracts of agricultural land.

Because of the mining potential in the *"Ridge Zone",* it is anticipated that this area will remain the focus of ongoing mining activities for a considerable time to come.

The proposed Transmission line corridors and Ikaros Substation do not appear to be substantially influenced by any of the land use planning proposals pertained in the approved IDP for the local municipal area. The land precincts which are traversed by the proposed corridor alignments are of no special significance and are not deemed to be environmentally sensitive to the extent which would preclude the accommodation of infrastructure such as powerlines. The sensitive area of the Magaliesberg Protected Natural Environment (PNE), which forms part of the local municipal jurisdiction, is not specifically affected by any of the proposed corridors. It may, therefore, be concluded that the proposed development of the powerlines and substations cannot be deemed to be inconsistent with the Spatial Development Framework of the approved IDP for the area. There would appear to be no fatal flaws in this regard, and it is confirmed that these conclusions were verified by the local authority officials responsible for the compilation of the IDP and the Spatial Development Frameworks.

## 3.12. Land Use Rights and Zoning Implications

### *3.12.1. Town Planning Schemes*

Land use rights in the study area are currently regulated in terms of two Town Planning Schemes:

- that pertaining to properties in proclaimed townships (urban areas), and
- that pertaining to properties/areas outside proclaimed townships (rural areas).

### *3.12.2. Affected Urban and Rural Areas*

With reference to Figure 3.7, the following townships may be affected by the proposed Transmission line corridors and the proposed Ikaros Substation site:

- Frishgewaagd
- Phatsima
- Rasimone (Bala)

- Phokeng
- Meriteng
- Boitekong
- Shashalaza
- Kana

Of the above-mentioned townships, only Phatsima, Meriteng and Boitekong are proclaimed. Land use management and regulation in these townships is administered in terms of the Rustenburg Town Planning Scheme 2000.

The remaining townships are not currently proclaimed and, together with all farm portions along the proposed corridors, are administered in terms of the Rustenburg District Council Town Planning Scheme 2000.

The properties that may be affected in the proclaimed townships are generally zoned for "*residential purposes*" in terms of the Rustenburg Town Planning Scheme 2000, and may, therefore, be used for the erection of single dwelling houses.

Except for the proclaimed residential properties, all other properties within the proposed corridors are zoned "*agricultural*" in terms of the Rustenburg District Council Town Planning Scheme 2000. Properties zoned "*agricultural*" may be used for the erection of dwelling houses and agricultural buildings. Figure 3.8 indicates the exact locality of each property potentially affected by the proposed project.

### *3.12.3. Implications of Zoning Restriction*

Although the zoning restrictions on properties identified ("*agriculture and residential"*) do not specifically address the development of Transmission lines, it is important to note that powerlines are seen as an important part of the required infrastructure of any development area. The same principle applies to roads, railway lines and water reservoirs.

As indicated on Figure 3.9*,* the proposed Transmission line corridors and related infrastructure may pass over land which is not specifically zoned for such purposes. Apart from the proposed Ikaros Substation site (which covers a substantial land area), the Transmission line corridors can generally be accommodated on such land use precincts, notwithstanding the seemingly incompatible zoning restrictions.

**Figure 3.8:**

**Figure 3.9:** Rustenburg Local Municipality: Land Use indicating agricultural area surrounding Marikana

Based on confirmation received from the local authority officials, it would be a requirement on the part of Eskom Transmission to register appropriate servitudes over the affected land parcels without the requirement to amend the land use zoning, within the ambits of the alternative corridors (refer to Appendix H). With regard to the Ikaros Substation site, the extent and configuration thereof would preclude the option of merely registering a servitude over land which is zoned for a different land use purpose. It is in this regard that it will be necessary to amend the Town Planning Scheme Records in the appropriate manner and to procure land use rights for the substation site.

Therefore, it would appear that, apart from the Ikaros Substation site, the current zoning restrictions along the proposed route alignments do not hold any substantial consequences for this proposed project. Likewise, the introduction of new Transmission line servitude over land zoned for other purposes (residential or agricultural) would not necessarily have an impact on the zoning restrictions on adjacent land as the local authority does not require any amendments of the Town Planning Scheme where it is proposed to install infrastructure such as powerlines. Although the new Transmission line servitude will, in certain instances, have the effect of *"dividing land"* along the route alignment, the development thereof will not, per say, result in a changed land use zoning configuration along such route alignment.

## 3.13. Land Use Regimes and Implications

### *3.13.1. Informal Settlements*

Statutory land use rights, and *de facto* land uses are required to be considered as separate matters, as the implications of the proposed Transmission lines and the Ikaros Substation on the above will differ. It is important to note that existing land uses on some of the affected properties are consistent with the statutory land use rights applicable to such properties. One of the reasons for this phenomenon is that some settlements (formal and informal) developed spontaneously on certain parcels of land belonging to the State, without any applications for changes in land use rights being submitted to the relevant authorities. This resulted in many of the existing settlements not being proclaimed as "*formal townships*" and the land portions on which these settlements are located are still zoned as "*Agricultural*". The Rustenburg Local Authority is currently in the process of rectifying some of these inconsistencies on a prioritised basis, and during discussions with the relevant officials at the above mentioned authority it was confirmed that these "*townships*" will soon be proclaimed. These informal settlements along the alternative corridors (un-proclaimed) include (refer to Figure 3.7):

- Rasimone (Bala)

- Phokeng
- Shashalaza
- Kana

### *3.13.2. Illegal Use of Land*

Some land uses along the proposed Transmission line corridors differ from the land use rights, and are regarded as "*illegal land uses*". Although these land uses can be regarded as "*illegal*", it is important to investigate the implications of the proposed powerline servitude thereon, as some of these illegal land users (occupants), for example squatters, have been residing on certain land portions for a number of years and (occupiers) may, therefore, have legitimate claims of *"ownership"*.

Figure 3.9 is an extract from the Rustenburg Local Municipality IDP and illustrates the land use regimes in the Rustenburg Local Municipality area of jurisdiction.

### *3.13.3. Land Use Categories along Alternate Transmission line Corridors*

With reference to Figure 3.9, the land uses along the alternative corridors of the proposed 400 kV Transmission lines can be categorised as follows:

- Towns and settlements (formal)
- Informal settlements (not proclaimed)
- Community/farming (traditional communal farming and rural occupation)
- Mining
- Citrus farming

Apart from the above-mentioned land use categories, certain infrastructure occurs within the proposed corridors and also affects land use configurations. These infrastructure related uses include:

- Provincial and local roads;
- Railway lines;
- Existing powerlines;
- Basic engineering services (water, sanitation,)

The existing land use regimes, as indicated on Figure 3.9, extracted from the Rustenburg Local Municipality IDP, and implications thereof are described below:

### *3.13.4. Towns and Settlements (formal)*

Proclaimed towns and settlements that may be influenced by the proposed corridors and Ikaros Substation are as follows (refer to Figure 3.7):

- Phatsima
- Meriteng
- Boitekong

### *3.13.5. Informal Settlements (un-proclaimed)*

The informal settlements that may be affected by the proposed northern corridor are as follows:

- Frisgewaagd
- Shashalaza
- Kana

The above-mentioned informal settlements are similar in terms of land uses, infrastructure and layout. The settlements consist of secondary roads with some basic services including water, electricity, and telephone lines. The dominant land use category in these townships is residential, supported by smaller shops, schools, and community centres.

Although shacks occur in some of these settlements, most of the houses are of a more formal nature. In all the identified settlements, the areas that may be affected by the proposed corridors are mainly residential stands.

### *3.13.6. Community/Farming*

The majority of the alternative proposed Transmission line corridors (including the Ikaros substation site) traverse areas which are used for traditional communal farming and rural occupation. These areas are not densely populated and large tracks of lands lie fallow without any identifiable use (refer to Figure 3.9). The farming methods evident in the area include cattle farming (on dry land) and limited subsistence crop farming.

### *3.13.7. Mining*

The Platinum Ridge (Merensky Ridge) to the north of the Magaliesberg is a prominent, form-giving feature of this area as mining shafts and associated informal settlements are located on this reef. The proposed corridors cross the Merensky Ridge at a number of points. The associated mining areas and properties owned by mining companies are, therefore, affected as indicated on Figure 3.7.

### *3.13.8. Citrus and other Commercial Farming*

The areas surrounding Marikana, as well as certain areas to the east and north of Rustenburg are used for citrus and other commercial farming (maize and corn).

### *3.13.9. Existing Infrastructure in the Study Area*

Major tar roads radiate from Rustenburg in all directions: Pretoria and Johannesburg (N4 east), Thabazimbi (R510), Derdepoort, Zeerust (N4 west) and Ventersdorp.

Existing substations within the study area include:

- Ararat Substation
- Trident Substation
- Bighorn Substation

Existing Transmission lines which occur within the study area include:

- the Matimba-Midas No 2 400 kV line, which forms the western and southern boundaries of study area;
- the Spitskop-Bighorn 400 kV and Bighorn-Pluto 275 kV lines, which forms the eastern boundary of study area;
- the Trident-Bighorn 275 kV line, which is located within study area; and
- the Spitskop-Ararat-Trident 275 kV line, which is located within study area

Distribution lines are in abundance within the study area, supplying power to numerous mining operations (including platinum and chrome mining, processing and smelting activities), as well as

to the towns of Brits, Marikana, Kroondal, Mooinooi, Rustenburg and surrounding communities, farms and businesses.

### *3.13.10. Resorts*

The area around the Magaliesberg Mountains has great tourism potential, and is therefore popular in terms of tourist-related facilities. The proposed southern corridor traverses the northern tip of the Magaliesberg range north-west of Rustenburg.

## 3.14. Demography and Communities

Employment in Rustenburg and its immediate surroundings is mainly provided by the platinum and chrome producers, which are also the biggest in the world. Granite is also extensively mined in the area and the four main quarry operators are Kudu Granite, Marikana Granite, and RED Granite. Agriculture, more to the east of Rustenburg, which include crops such as maize, citrus, chillies, sunflowers and tobacco) contributed 1% of employment in 2000. The Tobacco Research Council is situated in Rustenburg. Employment by economic sector for 1996 and 2000 is outlines in Table 3.3 below.

**Table 3.3:** Employment by economic sector for 1996 and 2000

| Industry | 1996 | 2000 |
|---|---|---|
| Mining | 59 783 | 66 439 |
| agriculture | 7 193 | 6 869 |
| manufacturing | 8 415 | 14 732 |
| construction | 4 261 | 7 689 |
| Trade | 12 548 | 29 459 |

The year 2000 dependency ration in the Rustenburg area was 1.25%.

Various Tribal Authorities are located within or close to the study area, namely:

- August Mokhatler Tribe
- Bafokeng Tribe (Royal Bafokeng Administration)
- Magata's Tribe
- Bakubung Ba-Ratheo Tribe

The various communities (formal and informal) located within or close to the study area include:

- Phatsima
- Meriteng
- Boitekong
- Frisgewaagd
- Shashalaza
- Kana
- Phokeng
- Rasimone (Bala).

### 3.15. Visual/Aesthetic Aspects

Critical areas within the study area in terms of views and visibility include the Magaliesberg and Pilanesberg Mountain ranges, the Magaliesberg Nature Reserve, the Pilanesberg National Park, public routes, and residences located in close proximity to the proposed corridors. The study area is already highly developed with several mining operations, townships, towns, roads, railways and powerlines. These developments impose an existing visual impact on the study area.