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

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

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

High Sensitivity Index Values indicate areas that are considered pristine, unaffected by human influences or generally managed in an ecological effective manner. These areas are comparable to nature reserves and even well managed farm areas. Low Sensitivity Index Values indicate areas of lower ecological status or importance in terms of vegetation attributes, or areas that have been negatively affected by human impacts or poor management. Sensitivity Criteria employed in assessing the floristic sensitivity of separate units may vary between different areas, depending on location, type of habitat, size, etc.

### 5.3 FAUNAL ASSESSMENT

The faunal assessment was conducted by D. Kamffer (Pr.Sci.Nat.). This faunal assessment is based on holistic ecological principles and included qualitative surveys across the major habitat types observed in the study area. This approach prefers biodiversity conservation to single species conservation; the focus is on sensitive faunal habitats rather than single red data species; these two approaches often coincide, but not always. The study area was therefore not considered in isolation and without linkage to surrounding natural faunal habitats. Within an ecological consideration, there is no difference in importance between species found in a system and the interactions between these species. Therefore, this assessment focused on assessing available faunal habitats; the sensitivities of these habitats are based on the status of each habitat as well as the level of isolation because of habitat transformation and fragmentation.

#### *5.3.1 General Faunal Observations*

Animals found within the study area's boundaries were identified using ecological indicators (tracks, dung, diggings, etc.), morphological characteristics (colour, size, shape etc.) and species-specific calls (especially for birds and frogs).

#### *5.3.2 Data analysis*

- All GPS acquired data is converted from text to shapefiles to allow GIS analyses.
- Shapefiles of environmental attributes such as geology, soil, hydrology and vegetation are incorporated in the analyses of available faunal habitats.
- Sensitivity maps are compiled, where relevant, subsequent to data analyses.
- Species lists are compiled for relevant taxa using fieldwork data, literature and data supplied by various other institutions and specialists.

### 5.3.3 *Red Listed fauna Probabilities*

Three parameters are used to assess the Probability of Occurrence for Red Listed species:

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

The estimated Probability of Occurrence for Red Data fauna species is presented in five categories, namely:

- Very low;
- Low;
- Moderate;
- High; and
- Very high.

### 5.3.4 *Faunal Habitat Sensitivities*

Faunal habitat sensitivities are subjectively estimated based on the following criteria:

- Habitat status;
- Connectivity;
- Recorded species composition & RD Probabilities; and
- Functionality.

and is place in one of the following classes:

- High;
- Medium-high
- Medium;
- Medium-low; or
- Low.

### 5.4.1 *Extent of the Impact*

The spatial scale of the impact was assessed according to the following criteria:

**(1)** None - no impact;
**(2)** Low - site specific, within the boundaries of the site;
**(3)** Medium – local, extending beyond the boundaries of the site, (i.e. up to 5km);
**(4)** High – Regional, extends far beyond the site boundaries (i.e. >5km); or
**(5)** Very high – National and/ or international.

### 5.4.2 *Duration of Impacts*

The lifespan of the impact was assessed to be either:

**(0)** None – no impact
**(1)** Low – short term, quickly reversible (0 – 5 years);
**(2)** Medium - medium term, reversible over time (5 – 15 years);
**(3)** High - long term, approximate life span of project (16 - 30 years); or
**(4)** Very high – permanent, over 30 years, resulting in permanent and lasting changes.

### 5.4.3 *Magnitude of Impacts*

The magnitude or severity of the impacts is indicated as either:

**(0)** None;
**(2)** Small (where the aspect will have no impact on the environment);
**(4)** Negligible/ minor – Systems are marginally affected by proposed development;
**(6)** Average - Medium or short-term impacts on the affected system. Mitigation is easy, cheap, less time consuming or not necessary. For example, a temporary fluctuation in the water table due to water abstraction;
**(8)** Severe - Medium to long term impacts on the affected system that could be mitigated. For example constructing a narrow road through vegetation with a low conservation value; or
**(10)** Irreversible - A permanent change to the affected system that cannot be mitigated. For example, the permanent change to topography resulting from a quarry.

### 5.4.4 *Probability of Impact*

The likelihood of the impact actually occurring was indicated as either:

**(1)** No impact;
**(2)** Improbable - possibility of the impact materializing is negligible (<10%);
**(3)** Probable – possibility that impact will materialise is likely, (10 – 49%);

**(4)** Highly probable - expected that impact will occur, (50 – 90%); or
**(5)** Definite - the impact will occur regardless of any prevention measures (>90%).

*5.4.5 Significance of the Impact*

Based on a synthesis of the information contained in the points above, the significance of a specific impact is expressed as follows:

**Significance = (Extent + Duration + Magnitude) x Probability**

Based on the above criteria the significance of issues will be determined. This is the importance of the impact in terms of physical extent and time scale, and is rated as:

- **Low (</= 30)**: the impacts are less important, but may require some mitigation action.
- **Medium (</= 60)**: the impacts are important and require attention; mitigation is required to reduce the negative impacts
- **High(>= 60)**: the impacts are of great importance. Mitigation is therefore crucial.

*5.4.6 Status of the Impact*

The impacts are assessed as either having a:

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

*5.4.7 Confidence*

This is the level knowledge/information that the environmental impact practitioner or a specialist has in his/her judgement, and is rated as:

- **Low**: the judgement is based on intuition and not on knowledge or information.
- **Medium**: common sense and general knowledge informs the decision.
- **High**: Scientific and or proven information has been used to give such a judgement.

# 6 THE BIOPHYSICAL ENVIRONMENT

## 6.1 LOCATION

The regional setting of the proposed site is illustrated in Figure 1, with a georeferenced Google Earth image presented in Figure 2 (images courtesy of Google Earth website and georeferenced using Arcview 3.2). The study area is situated approximately 300m south of the Hendrina Power Station, near Pullenshope, Mpumalanga Province. It is also situated approximately 33km southeast from Middelburg and 17km northwest from Hendrina Town. The N11 is situated approximately 6.5km to the east.

## 6.2 SURFACE WATER

A separate, detailed report on the hydrology, wetlands and aquatic ecology of the study area is compiled by Ecotone, general comments on this aspect are however included in this report as it relates to terrestrial biodiversity on a local and regional scale. For a detailed account of this component, the reader is referred to the relevant specialist report.

Areas of surface water contribute significantly towards the local and regional biodiversity of an area due to the atypical habitat that is available within the ecotonal areas. These ecotones (areas or zones of transition between different habitat types) are frequently occupied by species that occur in both of the bordering habitats, and is therefore generally rich in species due to the confluence of habitats. In addition to daily visitors that utilise water sources on a frequent basis, some flora and fauna species are specifically adapted to exploit the temporal or seasonal fluctuation in moisture levels in these areas, exhibiting extremely little tolerance levels towards habitat variation. Ecotonal interface areas form narrow bands around areas of surface water and they constitute extremely small portions when calculated on a purely mathematical basis. However, considering the high species richness, these areas are extremely important on a local and regional scale. Rivers also represent important linear migration routes for a number of fauna species as well as a distribution method for plant seeds.

The study area falls within the upper reaches of the Orange Primary Catchment area. No significant rivers or drainage lines are present within the study area, but endorheic pans and unnatural dams (manmade impoundments) are present in the site as well as in the immediate surrounds. These areas are likely to be affected by the proposed development and significant mitigation measures will be required. The status of these areas do vary significantly, from moderately to severely degraded.

**Figure 1: Regional setting of the study area**

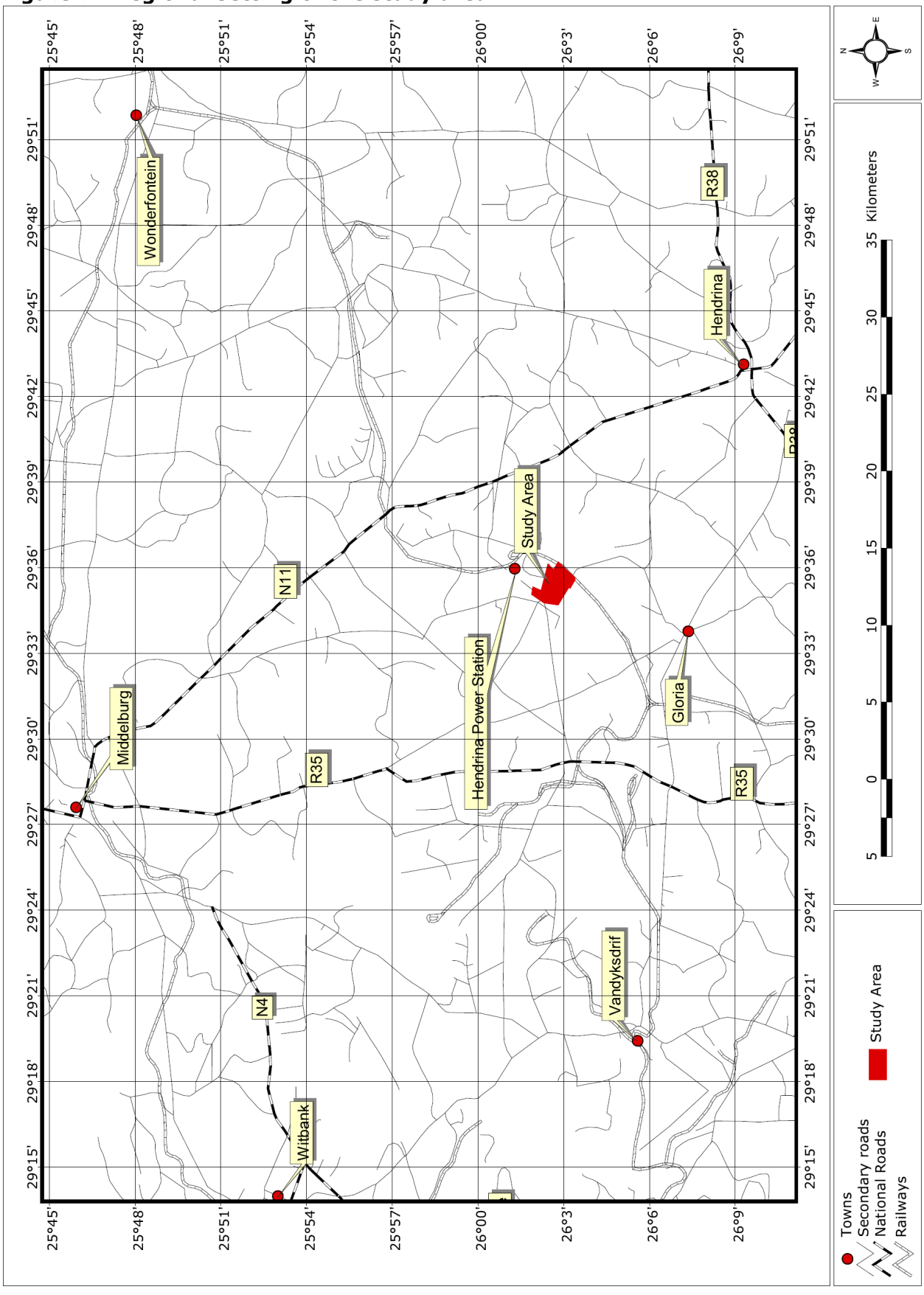
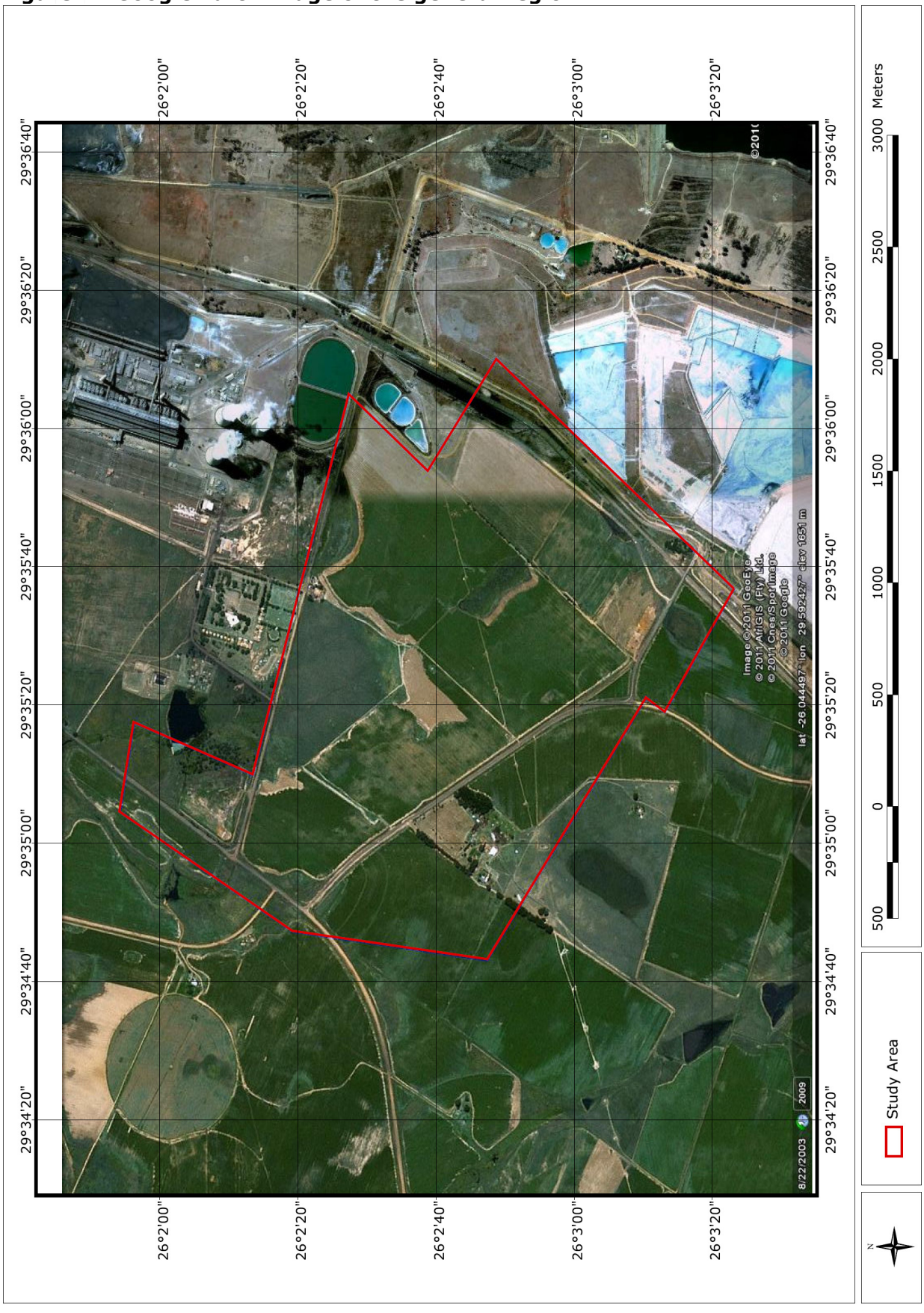


**Figure 2: Google Earth image of the general region**



## 6.3 Land Cover & Land Use of the Region

Land use often determines land cover; it is an important factor contributing to the condition of the land. Different uses have varying effects on the integrity of the land.

Land cover categories of the general region are presented in Figure 3. For the purpose of this assessment, land cover are loosely categorised into classes that represent natural habitat and land cover categories that resulted from habitat degradation and transformation on a local or regional scale. Areas that are characterised by high levels of transformation and habitat degradation is generally more suitable for development purposes as it is unlikely that biodiversity attributes of importance will be present or affected by development. Conversely, areas that are characterised by extensive untransformed and pristine habitat are generally not regarded suitable options for development purposes.

The region of the study area comprises extensive transformed habitat with small portions areas of natural grassland habitat. Major developments include agriculture, mining and residential areas. Consequently, local and regional habitat fragmentation and isolation is extremely high.

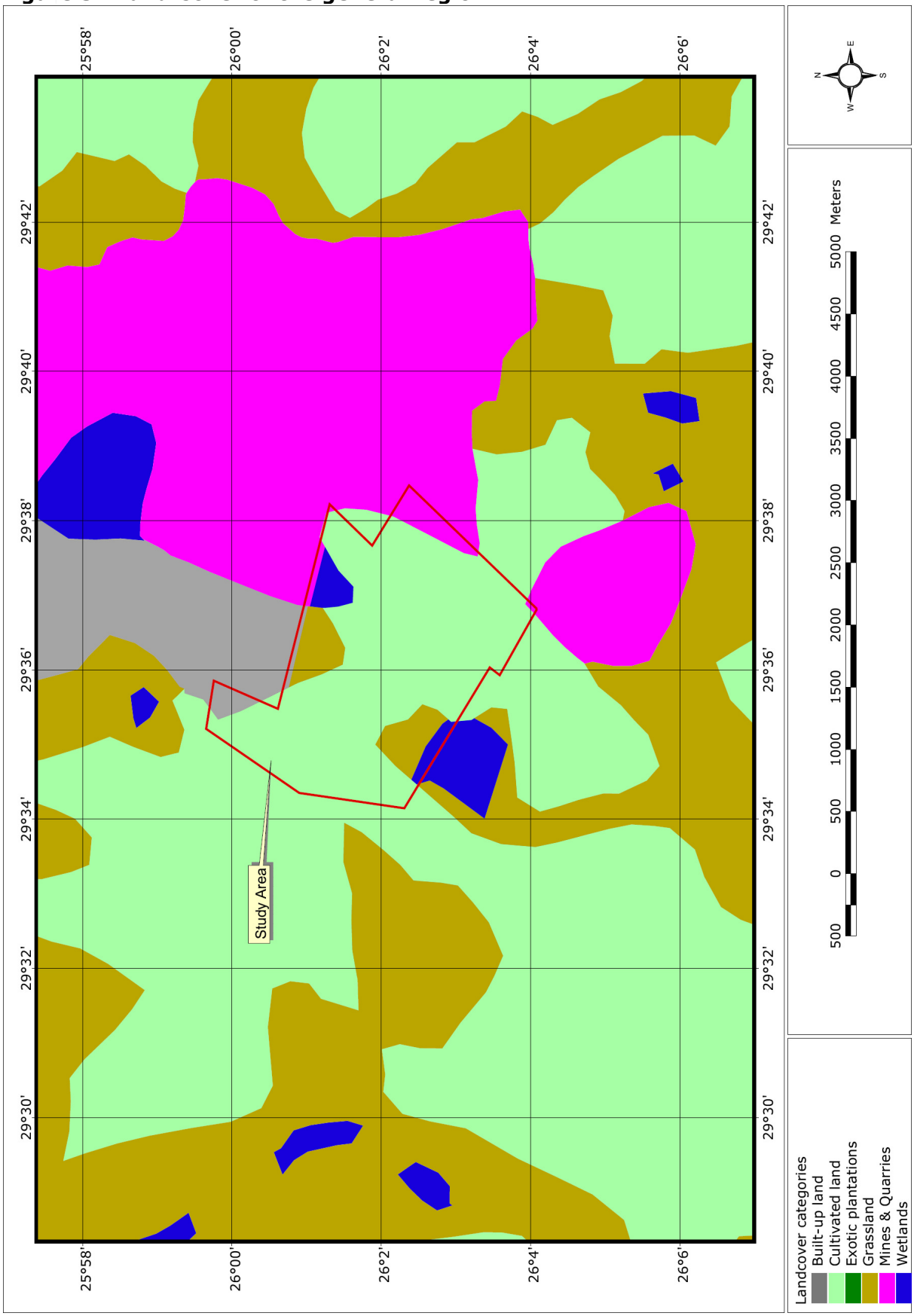
## 6.4 Topography, Relief and Slopes

The topography of the study area is described as Moderately Undulating Plains and Pans, situated approximately between 1,600m above sea level. No area of obvious physical variability is present within the study area and the immediate surrounds.

## 6.5 Declared Areas of Conservation

No declared area of conservation is present within the general surrounds of the study area.

**Figure 3: Land Cover of the general region**



Although it is not in the scope of this report to present a detailed account of the soil types and geology of the area, a basic description will suffice for this assessment as a strong association between habitat types and land types are typically known to exist.

The study area is situated within the Bb4 land type unit. A large part of the South African interior is occupied by a catena which in its perfect form is represented by (in order from highest to lowest in the upland landscape) Hutton, Bainsvlei, Avalon and Longlands forms. The valley bottoms are occupied by one or other gley soil (e.g. Rensburg, Willowbrook, Katspruit, Champagne forms). In addition to these, Glencoe, Wasbank, Westleigh, Kroonstad, Pinedene and Tambankulu (rare) forms, and Klipfontein and (occasional) Hillside soil series are found. Soils with hard plinthite are particularly common over sandstones in the moist climate zones in the eastern parts of the country. Depending on the extent to which tater tables have been operative over a landscape, Longlands and Avalon and related grey and yellow soils may predominate, even to the exclusion of red soils. Where water tables have not extended far beyond the valley bottoms, red soils may predominate with plinthic soils restricted to narrow strips of land around valley bottoms or pans. However, plinthic soils must cover more than 10% of the area for to qualify for inclusion in units Ba to Bd. Upland margalitic soils are absent or occupy less than 10% in units Ba to Bd.

Unit Ba indicates land in which red and/or yellow apedal soils (Hutton, Bainsvlei, Avalon, Glencoe and Pinedene forms ) that are dystrophic and/ or mesotrophic predominate over red and/ or yellow apedal soils that are eutrophic, and in which red soils (mainly Hutton and Bainsvlei) occupy more than a third of the area. The same rule, with appropriate adaptations, applies to units Bb (dystrophic and/ or mesotrophic, red soils not widespread.

The geology of the study area conforms to the Vryheid Arenite Formation. Arenite is a sedimentary rock composed of sand-sized fragments irrespective of composition. The Vryheid Formation follows conformably, and in most localities by way of a transition, on the Pietermaritzburg Shale Formation, from the southern part of Natal northwards. The formation is characterized by thick beds of yellowish to white cross-bedded sandstone and grit, which alternate with beds of soft, dark-grey, sandy shale and a few seams of coal.

# 7 MPUMALANGA BIODIVERSITY CONSERVATION PLAN

## 7.1 TERRESTRIAL BIODIVERSITY SENSITIVITIES ON A LOCAL SCALE

The local and regional designation of Mpumalanga Terrestrial Biodiversity Conservation Categories (MBCP) is illustrated in Figure 4.

The mandate for conserving biodiversity lies with state agencies at national, provincial and local levels of government, forming part of a wider responsibility for the environment and the sustainable use of natural resources. Constitutional and national laws require these environmental issues to be dealt with in cooperative, participatory, transparent and integrated ways. The MBCP is the first spatial biodiversity plan for Mpumalanga that is based on scientifically determined and quantified biodiversity objectives. The purpose of the MBCP is to contribute to sustainable development in Mpumalanga.

The MBCP maps the distribution of Mpumalanga Province's known biodiversity into six categories. These are ranked according to ecological and biodiversity importance and their contribution to meeting the quantitative targets set for each biodiversity feature. The categories are:

1 Protected areas - already protected and managed for conservation;
2 Irreplaceable areas - no other options available to meet targets––protection crucial;
3 Highly Significant areas - protection needed, very limited choice for meeting targets;
4 Important and Necessary areas - protection needed, greater choice in meeting targets;
5 Ecological Corridors – mixed natural and transformed areas, identified for long term connectivity and biological movement;
6 Areas of Least Concern – natural areas with most choices, including for development;
7 Areas with No Natural Habitat Remaining – transformed areas that do not contribute to meeting targets.

The study area comprises two of these categories, namely:

- No Natural Habitat Remaining; and
- Least Concern.

Areas of '**No Natural Habitat Remaining**' comprise approximately 35.8% of the Province. This category has already lost most of its biodiversity and ecological functioning. In the remnants of natural habitat that occur between cultivated lands and along river lines and ridges, residual biodiversity features and ecological processes do survive, but these disconnected remnants are biologically impoverished, highly vulnerable to damage and have limited likelihood of being able to persist. The more transformed a landscape becomes; the more value is placed on these remnants of natural habitat. Areas with no natural habitat remaining are preferred sites for developments, taking the potential presence of lands with high agricultural potential into consideration.

Biodiversity assets in landscapes categorized as '**Least Concern**' contributes to natural ecosystem functioning, ensuring the maintenance of viable species populations and providing essential ecological and environmental goods and services across the landscape. This category comprises approximately 25.5% of the Mpumalanga Province and although these areas contribute the least to the achievement of biodiversity targets they have significant environmental, aesthetic and social values and should not be viewed as wastelands or carte-blanche development zones. Development options are widest in these areas. At the broad scale, these areas and those where natural habitat has been lost serve as preferred sites for all forms of development. It is still required to consider other environmental factors such as socioeconomic efficiency, aesthetics and the sense-of-place in making decisions about development. Prime agricultural land should also be avoided for all non-agricultural land uses.

Land-use and administrative options for positive biodiversity outcomes include:

- Where this category of land occurs close to areas of high biodiversity value, it may provide useful ecological connectivity or ecosystem services functions, e.g. ecological buffer zones and corridors or water production. Encouragement needs to be given to biodiversity-friendly forms of management and even restoration options where appropriate;
- Develop incentives to reverse lost biodiversity for selected parcels of land where buffer zones and connectivity are potentially important;
- Standard application of EIA and other planning procedures are required; and
- These areas might serve as preferred sites for all forms of urban and industrial development (Land-Use Types 10 – 15).

## 7.2 DEVELOPMENT RESTRICTIONS IN TERMS OF THE MBCP

The MBCP suggests that the categories of 'Irreplaceable' and 'Highly Significant' should remain unaltered and rather be managed for biodiversity conservation purposes. Other categories incorporate increasing options for different types of land use that should be decided by the application of EIA procedures and negotiation between stakeholders. The MBCP also recognised that 35.8% of the Province is included in the category of 'No natural habitat remaining', which has very little biodiversity value.

The proposed development relates to 'Mining Activities' (Land Use 15 - Surface mining, dumping, dredging) and is included in the category 'Urban Industrial Land Uses' with the other development types such as Urban & Business Development, Major Development Projects, Linear Engineering Structures and Water Projects & Transfers. These six land uses cause the greatest environmental impact and are almost completely destructive of natural vegetation and natural biodiversity. Where biodiversity persists, it is artificially maintained, generally supporting only opportunistic assemblages of plants and animals. Ecosystem processes are completely disrupted, heavily impacted or artificially maintained at high cost. These land uses not only produce the highest local impacts but also dominate the dispersed and cumulative impacts. They are the most destructive and wide-ranging, often spreading hundreds of kilometres from their source,

especially along river systems. These land-use types also require special provision in land-use planning, impact assessment and mitigation.

Restrictions in terms of major developments according to the Mpumalanga Biodiversity Conservation Plan (MBCP) are illustrated in Figure 5. The proposed activity is regarded a 'Restricted' activity, but it is evident that the database does not consider smaller, localised biodiversity variations. These aspects will be addressed in the subsequent chapters.

**Figure 4: MBCP Conservation categories of the study area**

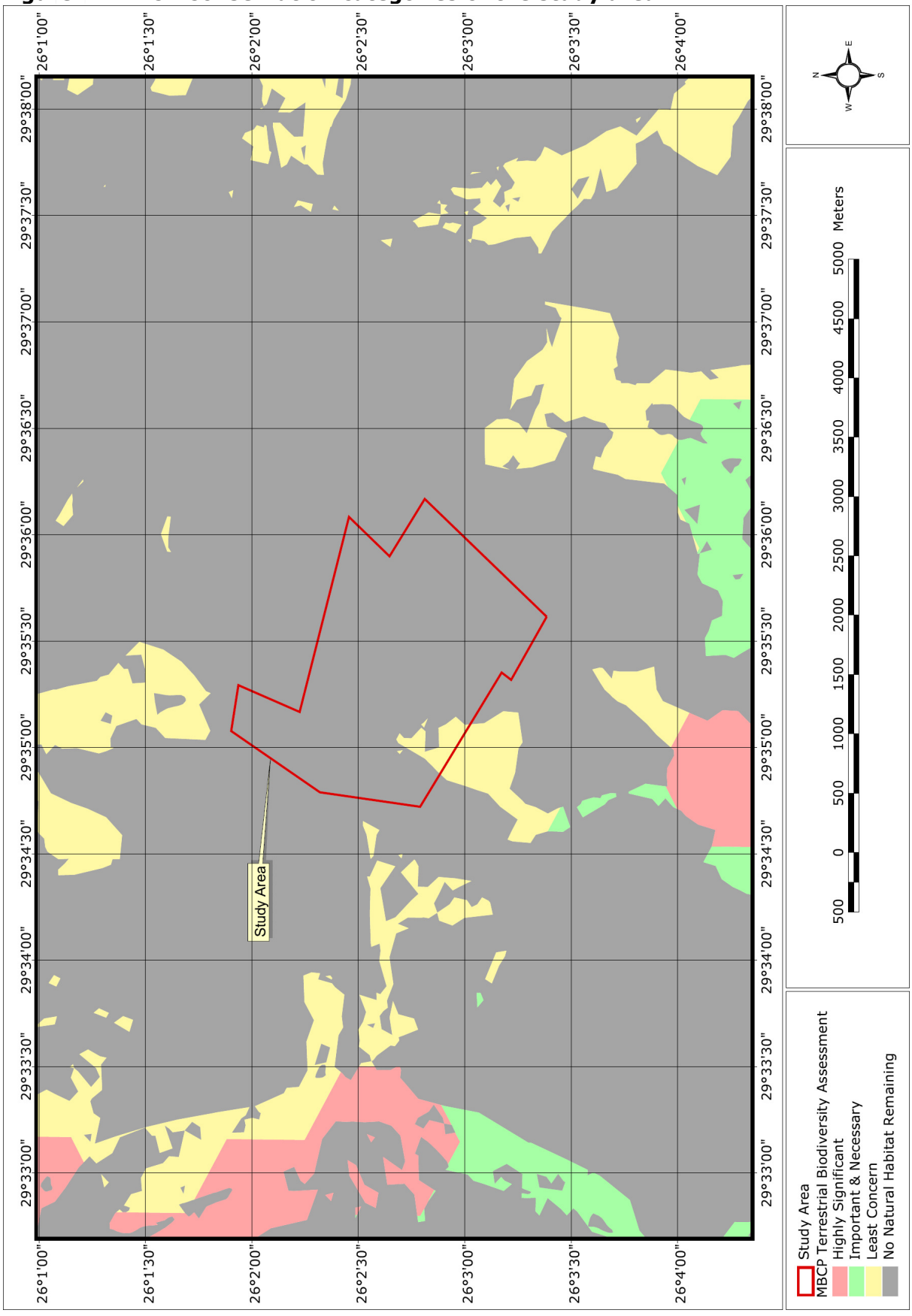
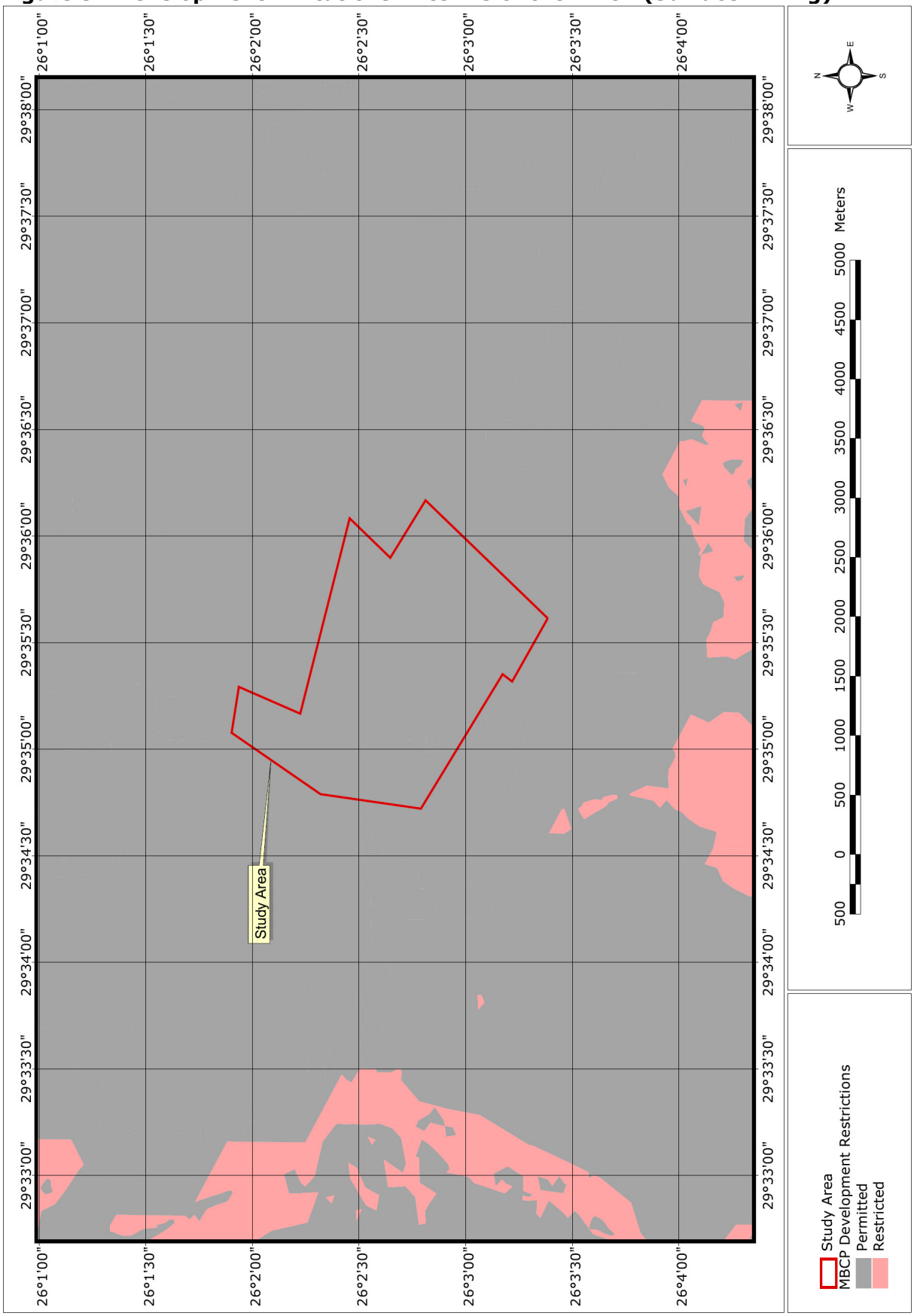


**Figure 5: Development limitations in terms of the MBCP (Surface Mining)**



# 8 FLORISTIC ASSESSMENT

## 8.1 REGIONAL FLORISTIC TRAITS

The study area is located in the Mesic Highveld Grassland Bioregion (Mucina & Rutherford, 2006), more specifically the Eastern Highveld Grassland vegetation type. This vegetation type is regarded Endangered and only very small fractions are conserved in statutory reserves. Some 44% is transformed by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact, indicated by land cover data. The Endangered status of this vegetation type warrants a medium-high environmental sensitivity.

The vegetation is short, dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya*, etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (Acac*ia caffra, Celtis africana, Diospyros lycioides, Parinari capensis, Protea caffra, P. welwitchii* and *Searsia magalismontana*). The following species are regarded representative of the Eastern Highveld Grassland vegetation type:

- **Graminoids**

*Aristida aequiglumis, A. congesta, A. junciformis* subsp*. galpinii, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D. tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. curvula, E. plana, E. racemosa, E. sclerantha, Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, T. rehmannii, Alloteropsis semialata* subsp*. eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris* and *Urelytrum agropyroides.*

- **Herbs**

*Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Pelargonium luridum, Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis* subsp*. setilobus, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides* subsp*. latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala Wahlenbergia undulata, Gladiolus crassifolius, Haemanthus humilis* subsp*. hirsutus, Hypoxis rigidula* var*. pilosissima, Ledebouria ovatifolia* and *Aloe ecklonis*

- **Low Shrubs**

*Anthospermum rigidum* subsp*. pumilum* and *Stoebe plumosa.*

The SANBI database indicates the known presence of only 38 plant species within this particular ¼-degree grid (2629BA). This low diversity is the result of the poor floristic knowledge of the area and is not a reflection of a poor habitat and floristic diversity (refer Table 3).

The following plant species are known to occur in the region of the study area (POSA, 2010):

**Table 3: PRECIS data for 2629BA (POSA, 2010)**

| ***Species*** | ***Family*** | ***Threat status*** | ***Growth form*** |
|---|---|---|---|
| *Ceratiosicyos laevis* | Achariaceae | LC | Climber |
| *Alepidea peduncularis* | Apiaceae | DDT | Herb |
| *Asclepias gibba* | Apocynaceae | LC | Herb |
| *Aponogeton junceus* | Aponogetonaceae | LC | Geophyte |
| *Schkuhria pinnata* | Asteraceae | | Herb |
| *Bryum dichotomum* | Bryaceae | | Bryophyte |
| *Cyperus difformis* | Cyperaceae | LC | Cyperoid |
| *Cyperus laevigatus* | Cyperaceae | LC | Cyperoid |
| *Cyperus marginatus* | Cyperaceae | LC | Cyperoid |
| *Fimbristylis complanata* | Cyperaceae | LC | Cyperoid |
| *Isolepis costata* | Cyperaceae | LC | Cyperoid |
| *Isolepis setacea* | Cyperaceae | LC | Cyperoid |
| *Kyllinga pulchella* | Cyperaceae | LC | Cyperoid |
| *Pycreus macranthus* | Cyperaceae | LC | Cyperoid |
| *Pycreus nitidus* | Cyperaceae | LC | Cyperoid |
| *Pycreus rehmannianus* | Cyperaceae | LC | Cyperoid |
| *Eriocaulon abyssinicum* | Eriocaulaceae | LC | Herb |
| *Acalypha angustata* | Euphorbiaceae | LC | Dwarf shrub |
| *Lespedeza cuneata* | Fabaceae | | Dwarf shrub |
| *Trifolium africanum* var. *africanum* | Fabaceae | LC | Herb |
| *Pelargonium pseudofumarioides* | Geraniaceae | LC | Herb |
| *Eucomis autumnalis* subsp. *clavata* | Hyacinthaceae | | Geophyte |
| *Juncus dregeanus* subsp. *dregeanus* | Juncaceae | LC | Helophyte |
| *Linum thunbergii* | Linaceae | LC | Herb |
| *Mossia intervallaris* | Mesembryanthemaceae | LC | Succulent |
| *Alloteropsis semialata* subsp. *eckloniana* | Poaceae | LC | Graminoid |
| *Andropogon eucomus* | Poaceae | LC | Graminoid |
| *Digitaria ternata* | Poaceae | LC | Graminoid |
| *Eragrostis curvula* | Poaceae | LC | Graminoid |
| *Eragrostis mexicana* subsp. *virescens* | Poaceae | | Graminoid |
| *Eragrostis patentissima* | Poaceae | LC | Graminoid |
| *Hyparrhenia hirta* | Poaceae | LC | Graminoid |
| *Panicum schinzii* | Poaceae | LC | Graminoid |
| *Sporobolus albicans* | Poaceae | LC | Graminoid |
| *Riccia cavernosa* | Ricciaceae | | Bryophyte |
| *Riccia natalensis* | Ricciaceae | | Bryophyte |
| *Riccia rosea* | Ricciaceae | | Bryophyte |
| *Riccia stricta* | Ricciaceae | | Bryophyte |

## 8.3 PLANT SPECIES OF CONSERVATION IMPORTANCE

No floristic species of conservation importance is indicated to occur in this region, according to the POSA database. Areas of natural grassland habitat and wetland habitat exhibit moderate levels of suitability for the potential presence of flora species of conservation importance, considering the current status.

## 8.4 RECORDED PHYTODIVERSITY OF THE SITE

The site investigation revealed the presence of approximately 71 plant species in the study area (Appendix 1). The diversity of this portion of land, in spite of the degraded status of most of the site, is regarded relative diverse, reflecting not only on the species richness of the regional vegetation types, but also the effect of transformation and the influx of plant species not normally associated with the region, such as weeds and alien invasive species.

The grassland physiognomy of the region is indicated by the absence of woody species in areas of natural vegetation. Grasses and forbs constitute the majority of the composition (refer Table 4). Grasses (12 species, 17.1%) and forbs (40 species, 57.1%) dominate the species diversity (refer Table 4).

**Table 4: Growth forms of the study area**

| *Growth Form* | *Number* | *Percentage* |
|---|---|---|
| Climbers | 1 | 1.43% |
| Forbs | 40 | 57.14% |
| Geophytes | 4 | 5.71% |
| Grasses | 12 | 17.14% |
| Hydrophilics | 4 | 5.71% |
| Sedges | 4 | 5.71% |
| Shrubs | 3 | 4.29% |
| Trees | 2 | 2.86% |
| **Total** | **70** | |

A total of 24 plant families are represented by the floristic diversity of the site, dominated by Asteraceae (24 species, 34.3%) and Poaceae (13 species, 18.6%) (refer Table 5).

**Table 5: Plant families of the study area**

| *Family* | *Number* | *Percentage* |
|---|---|---|
| Amaranthaceae | 1 | 1.43% |
| Anacardiaceae | 1 | 1.43% |
| Apiaceae | 1 | 1.43% |
| Asclepiadaceae | 2 | 1.43% |
| Asteraceae | 24 | 1.43% |
| Caesalpiniaceae | 1 | 1.43% |
| Cyperaceae | 4 | 1.43% |
| Dipsacaceae | 1 | 1.43% |
| Fabaceae | 4 | 1.43% |

| Table 5: Plant families of the study area | | |
|---|---|---|
| ***Family*** | ***Number*** | ***Percentage*** |
| Hypoxidaceae | 2 | 1.43% |
| Iridaceae | 1 | 1.43% |
| Lobeliaceae | 1 | 1.43% |
| Myrsinaceae | 1 | 1.43% |
| Orchideaceae | 1 | 1.43% |
| Oxalidaceae | 1 | 2.86% |
| Plantaginaceae | 2 | 2.86% |
| Poaceae | 13 | 2.86% |
| Polygonaceae | 1 | 2.86% |
| Rubiaceae | 2 | 4.29% |
| Scrophulariaceae | 1 | 5.71% |
| Solanaceae | 1 | 5.71% |
| Thymelaeaceae | 1 | 18.57% |
| Typhaceae | 1 | 34.29% |
| Verbenaceae | 3 | 1.43% |

## 8.5 FLORA SPECIES OF CONSERVATION IMPORTANCE

### *8.5.1 Red List Species*

South Africa's Red List system is based on the IUCN Red List Categories and Criteria Version 3.1 (finalized in 2001), amended to include additional categories to indicate species that are of local conservation concern. The IUCN Red List system is designed to detect risk of extinction. Species that are at risk of extinction, also known as threatened or endangered species are those that are classified in the categories Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

The South African Red List contains three additional categories (Critically Rare, Rare and Declining) to highlight plant species that are not in danger of extinction, but are of local conservation concern because they are rare, or there are threatening processes affecting their populations. These categories have been developed to highlight those taxa classified as Least Concern according to the IUCN system, should be considered in conservation prioritization processes. It is important to emphasize that the South African categories Critically Rare, Rare and Declining are intended for use in local conservation prioritization processes only. In submission to the IUCN Red List of Threatened Species, these taxa have to be categorized according to the IUCN system and therefore their global status will be Least Concern.

No Threatened plant species were recorded during the site investigation. Taking the habitat variability and status into consideration, it is regarded unlikely that species of conservation importance will occur within these parts. However, parts of the study area, endorheic pans in particular are regarded moderately suitable for the presence of *Crinum bulbispermum* (Declining), *Nerine gracilis* (Near Threatened) and *Kniphofia typhoides* (Near Threatened).