

***FAUNAL, FLORAL AND WETLAND ASSESSMENT AS  
PART OF THE ENVIRONMENTAL ASSESSMENT AND  
AUTHORISATION PROCESS OF THE IMPALA 18 SHAFT  
AND ASSOCIATED INFRASTRUCTURE, NORTH WEST  
PROVINCE***

**Prepared for**

**SLR Consulting (Africa) (Pty) Ltd.**

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**SECTION A – Summary**

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## EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a faunal, floral and wetland ecological assessment as part of the environmental assessment and authorisation process for the proposed Impala Shaft Project, hereafter referred to as the “study area” (Figures 1 & 2). The study area consists of the proposed Impala 18 Shaft, linear infrastructure including roads, railway lines, powerlines and pipelines as well as a sewage pipeline and associated sewage treatment plant (STP). The study area is located to the east of the R565 roadway and to the west of the R510 roadway and is located approximately 16km to the north of Rustenburg within the North West Province. The study area is surrounded by properties in which agricultural and mining activities as well as rural development dominate, leaving the surrounding areas largely transformed. The ecological assessment was therefore confined to the study area and its immediate surrounds and did not include an ecological assessment of surrounding properties. The surrounding area was however considered as part of the desktop assessment of the area.

### FLORAL ASSESSMENT

- The assessment site falls within the Savanna Biome, Central Bushveld Bioregion and falls within the Marikana Thornveld and Zeerust Thornveld vegetation types (Mucina & Rutherford, 2006).
- Four habitat units were identified during the assessment namely the Impacted Bushveld Habitat Unit, the Rocky Outcrop Habitat Unit, the Wetland Habitat Unit and the Transformed Habitat Unit.
- The Impacted Bushveld Habitat Unit covers the majority of the study area and includes areas where historical and current crop cultivation activities have led to loss of natural vegetation, bush encroachment and changes in vegetation structure, as well as areas where edge effects from current mining activities have taken place, which have also impacted on the natural vegetation.
- Included in the Impacted Bushveld Habitat Unit are limited areas that have not previously been cultivated, due to rocky soils and low exposed rocks being present. These areas, together with previously cultivated areas, are however currently utilised as communal grazing areas, which has affected the vegetation integrity of these areas.
- The Rocky Outcrop Habitat Unit comprises scattered rocky outcrops adjacent to the proposed linear infrastructure, within the Impala 18 Shaft development footprint and to the northeast of the proposed 18 Shaft. The vegetation occurring within these areas are notably different from that of the surrounding Impacted Bushveld Habitat Unit and comprises vegetation typical of rocky areas within the region.
- The Wetland Habitat Unit occurs throughout the study area and is associated with a number of non-perennial tributaries of the Leragana and Molapongwamongana Rivers to the west and east of the study area.
- The Transformed Habitat Unit is limited to the areas directly associated with mining activity, such as the proposed linear infrastructure situated in the immediate vicinity of the existing tailings facility.
- The various habitat units obtained the following Vegetation Index Scores (VIS):

Habitat unit	Score	Class	Motivation
Impacted Bushveld Habitat Unit	14	<b>D – Largely modified</b>	These areas have been impacted significantly by past agricultural activities and current grazing, trampling, bush encroachment and timber harvesting.
Rocky Outcrop Habitat Unit	22	<b>B – largely natural with few modifications</b>	These areas have high levels of ecological function, intact habitat, low alien invasion, very low disturbance.
Wetland Habitat Unit	15	<b>C – Moderately modified</b>	Some evidence of bush encroachment, overgrazing and alien plant species invasion was noted, although overall functioning is still largely intact.
Transformed Habitat Unit	3	<b>F – Modified completely</b>	These areas have been disturbed extensively due to mining activities.



- No RDL floral species were noted during the site assessment and it is considered unlikely that such species occur within the study area, apart from *Boophae disticha* (International Union on the Conservation of Nature (IUCN) listed as 'Declining'/ Orange-listed) which may occur in less disturbed areas within the Impacted Bushveld and Wetland Habitat Units. Should these species be encountered within the development footprints, such specimens should be relocated to similar suitable habitat.
- The tree species *Sclerocarya birrea* subsp. *africana* (Marula) is present on the study area, within the Rocky Outcrop Habitat Unit and in the rocky bushveld areas within the Impacted Bushveld Habitat Unit. This tree species is protected under the National Forests Act of 1998 (Act 84 of 1998). In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Water Affairs (or a delegated authority). Applications for such activities should be made to the responsible official in each province.
- Two new Marula trees are to be planted in suitable habitat for each tree destroyed, should relocation be unsuccessful.
- In addition, *Spirostachys africana* (Tamboti) trees are known to occur in the area. These trees are provincially protected under the Transvaal Nature Conservation Ordinance of 1983, but it is unclear whether this act is still applicable. The North West Province Biodiversity Conservation Bill, which was published for comments under Notice Nr. 394, Provincial Gazette 6719, dated 23 December 2009, incorporates the old Transvaal Nature Conservation Ordinance of 1983, but the status of this Bill is also currently unclear. It is therefore recommended that the relevant competent authority provides clarity on this issue in the Record of Decision (ROD).
- Few alien species occur on the study area. Furthermore, the species encountered were sparse, of low diversity and no significant populations or colonies were present. The majority of alien plant species are present within the Transformed and Wetland Habitat Units.
- A number of commonly occurring medicinal species were noted during the field assessment. The majority of these species occur within the Rocky Outcrop and Impacted Bushveld Habitat Units.

### Sensitivity mapping:

All wetland areas as per the Wetland Habitat Unit are regarded as being of high ecological sensitivity due to the contribution of the various wetland features to faunal migratory connectivity, wetland eco-services provision and the unique habitat provided for faunal and floral species, although these wetlands are considered to be of low to moderately low ecological significance in terms of wetland function and PES. A 32m buffer zone is deemed adequate to conserve the various wetland features encountered within the study area, while a 100m buffer zone is indicated around all wetland features as advocated by Regulation GN 704 of the National Water Act, 1998.

The Rocky Outcrop Habitat Unit, with intact habitat structure and ecological functioning is also considered to be of high ecological sensitivity. A 50m Buffer zones is applicable for the large rocky outcrop area to the northwest of the study area and care should be taken to avoid encroachment into the Rocky Outcrop Habitat Unit as represented by the outcrop areas bordering the linear infrastructure footprints.

The rocky bushveld areas occurring scattered within the Impacted Bushveld Habitat Unit, have seen fewer disturbances than the surrounding agricultural areas impacted by historical agricultural activities and are deemed to be of moderate ecological sensitivity, due to habitat structure being largely intact.

The Impacted Bushveld and Transformed Habitat Units have low ecological sensitivity as a result of current and historic anthropogenic activity having impacted on the ecological integrity of these areas.

### Impact assessment:

The table below serve to summarise the significance of perceived impacts on the floral ecology of the study area before mitigation measures are implemented. Also indicated is the impact significance of each perceived impact after the required mitigatory measures needed to minimise each impact are implemented.

### Summary of impact significance

Impact	Unmanaged	Managed
1A: Impact on habitat for floral species	Medium-High	Low
1B: Impact on floral diversity	Medium-High	Low



1C: Impact on important species	Medium-Low	Low
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## **FAUNAL ASSESSMENT**

### **Faunal habitat:**

- In general the vegetation within the study area comprises bushveld habitat, with scattered, widely spaces trees and an understorey of grass, which has largely been impacted by historic crop cultivation activities.
- High levels of anthropogenic activity as well as agricultural and mining activity within the study area and surrounding area have led to high levels of transformation of natural faunal habitat throughout the majority of the study area. The Rocky Outcrop and Wetland Habitat Units provide improved faunal habitat and food resources for a wide variety of faunal species, while the Impacted Bushveld Habitat Unit provide some faunal habitat and plays a role in terms of faunal species migration.

### **Faunal assessment:**

- Only commonly occurring faunal species were observed within the study area.
- The proposed development is unlikely to pose a threat to faunal conservation of the region.

### **RDL Faunal assessment:**

- No RDL mammals were observed during the site survey. In terms of conservation, the likelihood that any threatened RDL mammal species will be encountered within the majority of the study area is considered low.
- No RDL avifaunal species were identified during the site survey. However, there is a probability that *Tyto capensis* (African Grass Owl), *Falco peregrinus* (Peregrine Falcon), *Polemaetus bellicosus* (Martial Eagle), *Sagittarius serpentarius* (Secretary bird), *Gyps coprotheres* (Cape Vulture), *Ardeotis kori* (Kori Bustard) and *Glareola pratincola* (Red Winged Pratincole) may utilise the study area for foraging purposes.
- No RDL amphibian species were identified during the site survey and the probability of such species occurring is low, with the exception of *Pyxicephalus adspersus* (Giant Bullfrog), which has an increased likelihood of being present. The Probability of Occurrence (POC) of this species is however below 60%.
- No RDL listed reptiles species were identified during the site assessment, there is however a probability that the *Python natalensis* (South African Python) may be present in the vicinity of the Rocky Outcrop Habitat Unit.
- No RDL invertebrate species were encountered on the study area. The proposed development within the study area is deemed unlikely to pose a significant conservation threat on invertebrate species due to the majority of habitat having been impacted and mining activities in the area.
- No threatened spider or scorpion species were identified within the study area. It is also highly unlikely that threatened spiders and scorpions will be encountered in the study area due to the predominantly impacted nature of the majority of the study area.

### **RDSIS assessment:**

- Eight RDL species calculated a POC greater than 60% namely *Python natalensis* (African Rock Python), *Gyps coprotheres* (Cape Vulture), *Ardeotis kori* (Kori Bustard), *Falco peregrinus* (Peregrine Falcon), *Glareola pratincola* (Red Winged Pratincole), *Polemaetus bellicosus* (Martial Eagle), *Tyto capensis* (African Grass Owl) and the *Sagittarius serpentarius* (Secretary bird).
- The greater than 60% POC likelihood of these RDL faunal species is largely due to them utilising the study area for foraging purposes.
- The RDSIS assessment of the study area calculated a low score of 38%, indicating a low importance to RDL faunal species conservation within the study area in terms of conservation, this means that there is a moderate chance of RDL faunal species being encountered within the study area.

### **Impact assessment:**

- The table below serves to summarise the significance of perceived impacts on the faunal biodiversity of the study area before mitigation measures are implemented. Also indicated is the impact significance of each perceived impact after the required mitigatory measures needed to minimise each impact are implemented.
- It is evident that prior to mitigation the impacts are medium-high and medium-low level impacts. If mitigation takes place the impacts will be reduced to medium-low and low level impacts.



Impact	Unmanaged	Managed
1: Impact on faunal habitat and ecological structure	Medium-High	Medium-Low
2: Impact on faunal diversity and ecological integrity	Medium-Low	Low
3: Impact on RDL faunal species	Medium-Low	Low

## **WETLAND ASSESSMENT**

### **Wetland delineation:**

During the assessment, the following temporary zone indicators were used. Please note that vegetation and terrain units were found to be the most accurate indicators of the temporary zone boundary, as soils were of limited use due to black vertic soils being the dominant soil type in both wetland and terrestrial areas. Thus, a combination of distinct wetland vegetation communities and terrain units was utilised as primary indicator of the wetland temporary zone:

- Terrain units were utilised as the primary indicator of the wetland temporary zone, due to all the wetland features being valley bottom wetlands.
- Vegetation was utilised for the identification of the wetland temporary zone and was also used during the delineation of the wetland features. Although the wetland features comprise a largely similar species composition to that of the adjacent terrestrial area, the vegetation within the wetland boundaries was clearly affected by a fluctuating water level at or near the soil surface, thus forming a distinct community indicative of wetland conditions.
- Surface water was absent during the field assessment, but saturated soils were noted within some of the wetland areas.
- The soils in the area do not serve as an accurate wetland indicator due to black vertic soil forms being the dominant soil type in both wetland and terrestrial areas.

### **Wetland assessment:**

- The study area falls within the Bushveld Basin Ecoregion and is located within the A22F and A22J quaternary catchments.
- The South African National Biodiversity Institute (SANBI) Wetland Inventory (2006) and National Freshwater Ecosystem Priority Areas (NFEPA) (2011) databases were consulted to define the aquatic ecology of the wetland or river systems close to or within the study area that may be of ecological importance. Aspects applicable to the study area and surroundings are discussed below:
  - The study area falls within the Crocodile (West) and Marico Water Management Area (WMA). Each WMA is divided into several sub-Water Management Areas (subWMAs), where catchment or watershed is defined as a topographically defined area which is drained by a stream or river network. The Sub-Water management unit indicated for the study area is the Elands sub-WMA.
  - The subWMA is not regarded important in terms of fish sanctuaries, rehabilitation or corridors.
  - The subWMA is not considered important in terms of translocation and relocation zones for fish.
  - The subWMA is not listed as a fish Freshwater Ecosystem Priority Areas (FEPA).
  - Tributaries of the Leragane River cross the Impala 18 Shaft development footprint as well as some of the linear infrastructure of the study area.
  - The Leragane River is a perennial river classified as a Class D (largely modified) river. It is not free flowing and is not classified as a flagship river or as a FEPA river.
  - A tributary of the Molapongwamongana River crosses the sewage line of the study area.
  - The Molapongwamongana River is a non-perennial river classified as a Class D (largely modified) river. It is not free flowing and is not classified as a flagship river or as a FEPA river.
  - No wetland features as indicated by the NFEPA database (2011) are crossed or contained by the study area.
- Eight wetland features (Wetland 1 and Wetland Crossings A – G) were identified within the study area. These wetland features were characterised as channelled and unchannelled valley bottom wetland systems.
- From the assessment it was found that Wetland 1 and Wetland Crossings B, C, D, E, F and G provide moderately low levels of ecological functioning and ecoservices provision, with Wetland Crossing A providing intermediate levels.



- All wetland features identified are considered to have a PES falling within the boundaries of Class C (Moderately Modified). This is primarily due to impacts from historical agricultural activity affecting the wetlands.
- All results obtained from the NWCS that was used in the determination of the appropriate EMC class were considered. The results obtained from the wetland assessment indicate moderate to high levels of transformation on all levels of ecology and functionality, leading to the wetlands being of low ecological significance. Therefore, the EMC class deemed appropriate to enhance and maintain currently ecology as well as functionality is Class C (Moderately modified) for all the wetland features. Mitigation measures and recommendations stipulated in this report, if followed, are deemed adequate to reach this goal. On a localised scale however, the catchment wide impacts on the drainage system may limit the ability to reach this EMC objective.

#### **Impact assessment:**

The table below summarises the findings indicating the significance of the impacts before mitigation takes place and the likely impact levels if management and mitigation takes place. In the consideration of mitigation it is assumed that a high level of mitigation takes place but which does not lead to prohibitive costs. From the table it is evident that prior to mitigation all of the impacts are medium-high level impacts. If mitigation and effective management takes, considering that the impact on wetland resources due to the construction of Shaft 18 will only be slightly mitigable, impact significance can be slightly reduced to medium-high and medium-low significance.

<b>Impact</b>	<b>Unmanaged</b>	<b>Managed</b>
1: Loss of low significance wetland habitat and ecological structure	Medium-High	Medium-high
2: Changes to low significance wetland ecological and sociocultural service provision	Medium-High	Medium-low
3: Impacts on low significance wetland hydrological function	Medium-High	Medium-low





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**Glossary of Terms & Acronyms**

°C – Degrees Celsius.

*Alien vegetation* – Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.

*BGIS* – Biodiversity Geographic Information Systems

*Biome* – A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.

*Bush encroachment* – A state where undesirable woody elements gain dominance within grassland, leading to depletion of the grass component. Typically due to disturbances and transformations as a consequence of veldt mismanagement (overgrazing, incorrect burning, etc.).

*CARA* – Conservation of Agricultural Resources Act (Act 43 of 1983)

*CBA* – Critical Biodiversity Area

*DEAT* – Department of Environmental Affairs and Tourism

*Decreaser grass* – Grass abundant in veldt in good condition, which decreases when veldt is under- or over-utilized.

*DEMC* – Desired Ecological Management Class

*DWA* – Department of Water Affairs (previously known as DWAF)

*DWAF* – Department of Water Affairs and Forestry (currently known as DWA)

*EAP* – Environmental Assessment Practitioner

*Ecoregion* – An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".

*EIA* – Environmental Impact Assessment

*EIS* – Ecological Importance and Sensitivity

*EMC* – Ecological Management Class

*EMP* – Environmental Management Programme

*Endangered* – Organisms in danger of extinction if causal factors continue to operate.

*Endemic species* – Species that are only found within a pre-defined area and endemism can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.

*ESA* – Ecological Support Areas

*EVC* – the Extent of Vegetation Cover (used in VIS calculations)

*FEPA* – Freshwater Ecosystem Priority Areas

*GIS* – Geographic Information System

*GPS* – Global Positioning System

*ha* – Hectares





*HGM* – Hydrogeomorphic

*IBA* – Important Bird Areas

*HGM* – Hydrogeomorphic

*IHAS* – Invertebrate Habitat Assessment System

*IHIA* – Intermediate Habitat Integrity Assessment

*Increaser 1 grass* – Grass species that increase in density when veld is under-utilized.

*Increaser 2 grass* – Grass species that increase in density in over-utilized, trampled or disturbed veld.

*Increaser 3 grass* – Grass species that increase in density in over and under-utilized veld.

*Indigenous vegetation* – Vegetation occurring naturally within a defined area.

*IUCN* – International Union for the Conservation of Nature

*m* – Metres

*MAMSL* – Metres Above Mean Sea Level

*MAP* – Mean Annual Precipitation

*MAPE* – Mean Annual Potential for evaporation

*MASMS* – Mean Annual Soil Moisture Stress

*MAT* – Mean Annual Temperature

*mm* – Millimetre

*MPRDA* – Mineral and Petroleum Resources Development Act (Act 28 of 2002)

*NBA* – National Biodiversity Assessment

*NEMA* – National Environmental Management Act (Act 107 of 1998)

*NEMBA* – National Environmental Management: Biodiversity Act (Act 10 of 2004)

*NPAES* – National Protected Areas Expansion Strategy (2008)

*NFEPA* – National Freshwater Ecosystem Priority Areas

*NWA* – National Water Act (Act 36 of 1998)

*Orange Listed* – Species that are not Red Data Listed, but are under threat and at risk of becoming RDL in the near future. Usually allocated to species with conservation status of *Near Threatened (NT)*, *Least Concern (LC)*, *Rare* and *Data Deficient (DD)*.

*NW SoER* – North West Province State of the Environment Report (2002)

*PEMC* – Proposed Ecological Management Class

*PES* – Present Ecological State

*Pioneer species* – A plant species that is stimulated to grow after a disturbance has taken place. This is the first step in natural veld succession after a disturbance has taken place.

*POC* – Probability of Occurrence.

*PRECIS* – Pretoria Computer Information Systems

*PVC* – Percentage Vegetation Cover of indigenous species (used in VIS calculations)

*QDS* – Quarter Degree Square (1:50,000 topographical mapping references)



**RAMSAR** – The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.

**Rare** – Organisms with small populations at present.

**RDL (Red Data listed) species** – Organisms that fall into the *Extinct in the Wild (EW)*, *critically endangered (CR)*, *Endangered (EN)*, *Vulnerable (VU)* categories of ecological status.

**RDM** – Resource Directed Measures

**RDSIS** – Red Data Sensitivity Index Score

**REC** – Recommended Ecological Category

**RHP** – River Health Programme

**Riparian system** – Riparian wetlands are recognised as boundaries between the terrestrial and riverine systems.

**RIS** – Recruitment of Indigenous species (used in VIS calculations)

**SANBI** – South African National Biodiversity Institute

**SAS** – Scientific Aquatic Services CC

**Secondary vegetation** – Vegetation established naturally after a dramatic disturbance (e.g. clearing, agriculture etc.) where secondary species account for more than 70% of the vegetation cover.

**SI** – Structural Intactness (used in VIS calculations)

**subWMA** – sub-Water Management Area

**TSP** – Threatened Species Programme

**TSS** – Total Species Score (used in RDSIS calculations)

**VIS** – Vegetation Index Score

**WMA** – Water Management Area

**WULA** – Water Use License Application

**WUL** – Water Use License



# 1. INTRODUCTION

## 1.1 *Background*

Scientific Aquatic Services (SAS) was appointed to conduct a faunal, floral and wetland ecological assessment as part of the environmental assessment and authorisation process for the proposed Impala 18 Shaft Project, hereafter referred to as the “study area” (Figures 1 & 2). The study area consists of the proposed Impala 18 Shaft, linear infrastructure including roads, railway lines, powerlines and pipelines as well as a sewage pipeline and associated sewage treatment plant (STP). The study area is located to the east of the R565 roadway and to the west of the R510 roadway and is located approximately 16km to the north of Rustenberg within the North West Province. The study area is surrounded by properties in which agricultural and mining activities as well as rural development dominate, leaving the surrounding areas largely transformed. The ecological assessment was therefore confined to the study area and its immediate surrounds and did not include an ecological assessment of surrounding properties. The surrounding area was however considered as part of the desktop assessment of the area.

This report, after consideration and the description of the ecological integrity of the study area, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and mining proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed development activities.







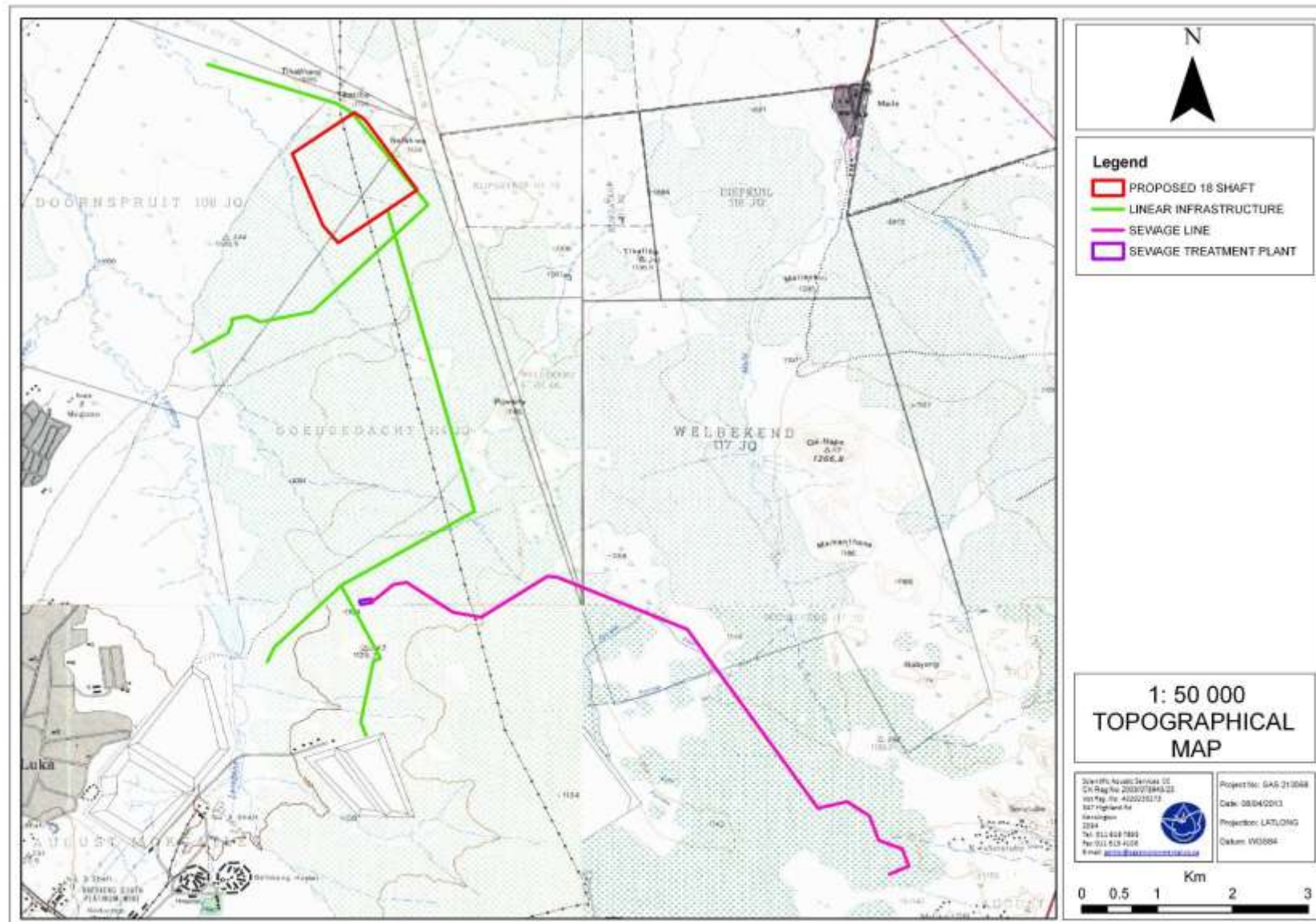


Figure 2: Study area depicted on a 1:50 000 topographical map in relation to its surrounding area.



## **1.2 Project Scope**

Specific outcomes in terms of this report are as follows:

Ecological Assessment:

- To conduct a Red Data Listed (RDL) species assessment, including potential for species to occur on the study area and the implementation of a Red Data Sensitivity Index Score (RDSIS) for the study area;
- To provide faunal and floral inventories of species as encountered on site;
- To determine and describe habitats, communities and ecological state of the study area;
- To describe the spatial significance of the study area with regards to surrounding natural areas; and
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/or any other special features; and
- To determine the environmental impacts of the proposed mining activity on the terrestrial ecology within the study area.

Wetland Assessment:

- To define the Present Ecological State (PES) of each wetland system within the study area;
- To determine the functioning of each system and the environmental and socio-cultural services that the system provide;
- To advocate a Recommended Ecological Category (REC) for each wetland feature;
- To delineate all wetlands or riparian zones occurring within the assessment site and
- To determine the environmental impacts of the proposed mining activity on the wetland areas within the study area.

## **1.3 Assumptions and Limitations**

The following assumptions and limitations are applicable to this report:

- The ecological assessment is confined to the study area and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment.
- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary.
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal and floral communities have been accurately assessed and considered.



- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa on the study area may therefore been missed during the assessment.
- The wetland delineation as presented in this report is regarded as a best estimate of the wetland boundary based on the site conditions present at the time of assessment.
- Wetlands and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate wetland species. Within this transition zone some variation of opinion on the wetland boundary may occur, however if the Department of Water Affairs and Forestry (DWAF) 2005 method is followed, all assessors should get largely similar results.

## **2. ASSESSMENT APPROACH**

### **2.1 General approach**

In order to accurately determine the PES of the study area and capture comprehensive data with respect to wetland, faunal and floral taxa, the following methodology was used:

- Maps, aerial photographs and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the study area was made in order to confirm the assumptions made during consultation of the maps.
- Literature review with respect to habitats, vegetation types and species distribution was conducted.
- Relevant data bases considered during the assessment of the study area included the South African National Biodiversity Institute (SANBI) Threatened species programme (TSP) and Pretoria Computer Information Systems (PRECIS).
- Site visits were undertaken during March 2013 to determine the ecological status of the proposed development sites and the surrounding area. A reconnaissance 'drive around' followed by thorough 'walk through' on foot was undertaken.
- Specific methodologies for the assessment, in terms of field work and data analysis of faunal, floral and wetland ecological assemblages will be presented in the relevant sections along with the methodologies for assessing the integrity and function of wetland systems.

### **2.2 Ecological Impact Assessment Methodology**

In order for the EAP to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/ impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/

impacts have been assessed. The method to be used for assessing risks/ impacts is outlined in the sections below.

The first stage of risk/ impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that are possessed by an organisation.
- An **environmental aspect** is an ‘element of an organizations activities, products and services which can interact with the environment’<sup>1</sup>. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

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<sup>1</sup> The definition has been aligned with that used in the ISO 14001 Standard.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the below. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigation is necessary<sup>2</sup>.

The assessment of significance is undertaken twice. Initial significance is based only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act (No. 108 of 1997) (NEMA) in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

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<sup>2</sup> Some risks/impacts that have low significance will however still require mitigation

**Table 1: Criteria for assessing significance of impacts****CONSEQUENCE DESCRIPTORS**

<b>Severity of Impact</b>	<b>Rating</b>
Insignificant/non-harmful	1
Small/potential harmful	2
Significant / slightly harmful	3
Great / harmful	4
disastrous / extreme harmful	5
<b>Spatial Scope of Impact</b>	<b>Rating</b>
Activity specific	1
Mine specific (within the mine boundary)	2
Local area (within 5 km of the mine boundary)	3
Regional (Greater Rustenburg area)	4
National	5
<b>Duration of Impact</b>	<b>Rating</b>
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

**LIKELIHOOD DESCRIPTORS**

<b>Frequency of Activity / Duration of Aspect</b>	<b>Rating</b>
Annually or less / low	1
6 Monthly / temporary	2
Monthly / infrequent	3
Weekly / life operation / regularly / likely	4
Daily / permanent / high	5
<b>Frequency of Impact</b>	<b>Rating</b>
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

**Table 2: Significance rating matrix**

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

**Table 3: Positive/Negative Mitigation Ratings**

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Improve current management	Maintain current management
High	101-125	Improve current management	Maintain current management
Medium-high	76-100	Improve current management	Maintain current management
Medium-low	51-75	Maintain current management	Improve current management
Low	26-50	Maintain current management	Improve current management
Very low	1-25	Maintain current management	Improve current management

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the project's area of influence encompassing:
  - Primary project site and related facilities that the client and its contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/ Impacts were assessed for all stages of the project cycle including:
  - Construction;

- Operation; and
  - Rehabilitation.
- If applicable, transboundary or global effects were assessed;
- Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed.
- Particular attention was paid to describing any residual impacts that will occur after rehabilitation.

## 2.2.1 Mitigation measure development

The following points present the key concepts considered in the development of mitigation measures for the proposed development.

- Mitigation and performance improvement measures and actions that address the risks and impacts<sup>3</sup> are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimization, mitigation or compensation.
- Desired outcomes are defined, and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation.

## 2.3 Sensitivity Mapping

All the ecological features of the study area were considered and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition identified locations of protected species were also marked by means of GPS. A Geographic Information System (GIS) was used to project these features onto aerial photographs and topographic maps. The sensitivity map should guide the design and layout of the proposed development.

## 2.4 Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through construction, operation and closure through to after care and maintenance.

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<sup>3</sup> Mitigation measures should address both positive and negative impacts



### **3. LAND USE AND CONSERVATION**

## **CHARACTERISTICS OF THE STUDY AREA**

#### **3.1 *Importance According to the Mining and Biodiversity Guideline (2012)***

The Mining and Biodiversity Guideline (2012) provides explicit direction in terms of where mining-related impacts are legally prohibited, where biodiversity priority areas may present high risks for mining projects and where biodiversity may limit the potential for mining. The Guideline distinguishes between four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining. These categories include: Legally Protected Areas, Highest Biodiversity Importance, High Biodiversity Importance and Moderate Biodiversity Importance. According to the Mining and Biodiversity Guideline the study area covers some of the extent of a High Biodiversity Importance area as well as a Moderate Biodiversity Importance area (Figure 3).

High Biodiversity Importance areas include protected area buffer (including buffers around National Parks, World Heritage Sites and Nature Reserves), Transfrontier conservation Areas (remaining areas outside of formally proclaimed protected areas), other identified priorities from provincial spatial biodiversity plans and high water yield areas, amongst others. These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, for maintaining important ecosystem services for particular communities or the country as a whole. An environmental impact assessment should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and red flags for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations. Moderate Biodiversity Importance areas include Ecological Support Areas (ESAs), vulnerable ecosystems and focus areas for protected area expansion. Areas of Moderate Biodiversity Importance are considered of moderate risk for mining. EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.

### **3.2 *National List of Threatened Terrestrial Ecosystems for South Africa (2011)***

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value (SANBI, BGIS).

According to the National List of Threatened Terrestrial Ecosystems (2011) the proposed sewage line runs through a portion of the remaining extent of the vulnerable Marikana Thornveld Ecosystem (Figure 4).

### **3.3 *NPAES Focus Areas for Protected Area Expansion***

According to the NPAES database, the majority of the proposed linear and sewage infrastructure associated with the development, as well as the proposed 18 shaft, falls within an area earmarked for expansion of a National Protected Area (Figure 5).

The goal of the National Protected Area Expansion Strategy (NPAES) is to achieve cost effective protected area expansion for ecological sustainability and adaptation to climate change. The NPAES sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. It deals with land-based and marine protected areas across all of South Africa's territory (SANBI BGIS).



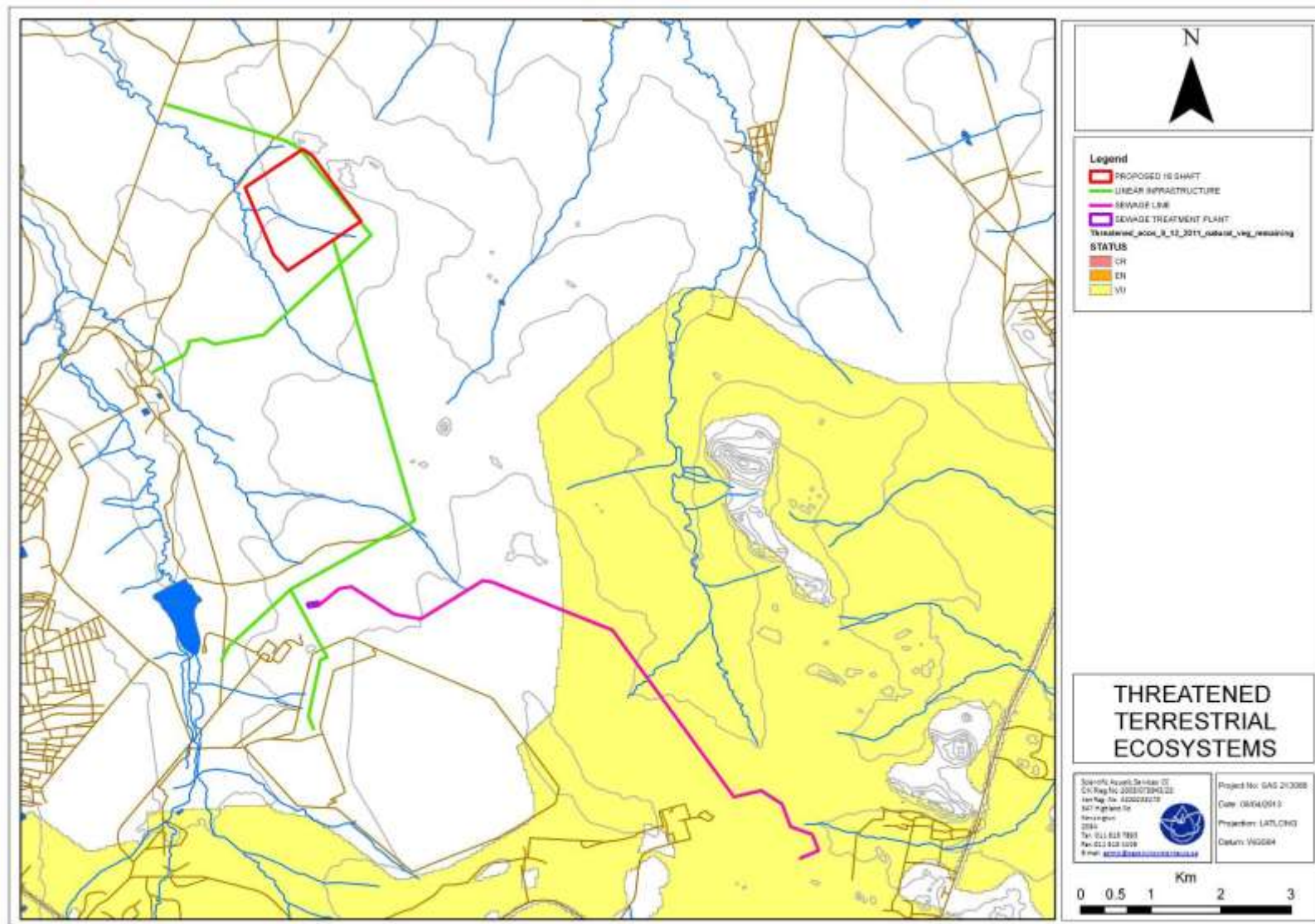


Figure 4: Remaining extent of threatened ecosystems for the study area (National List of Threatened Terrestrial Ecosystems, 2011).





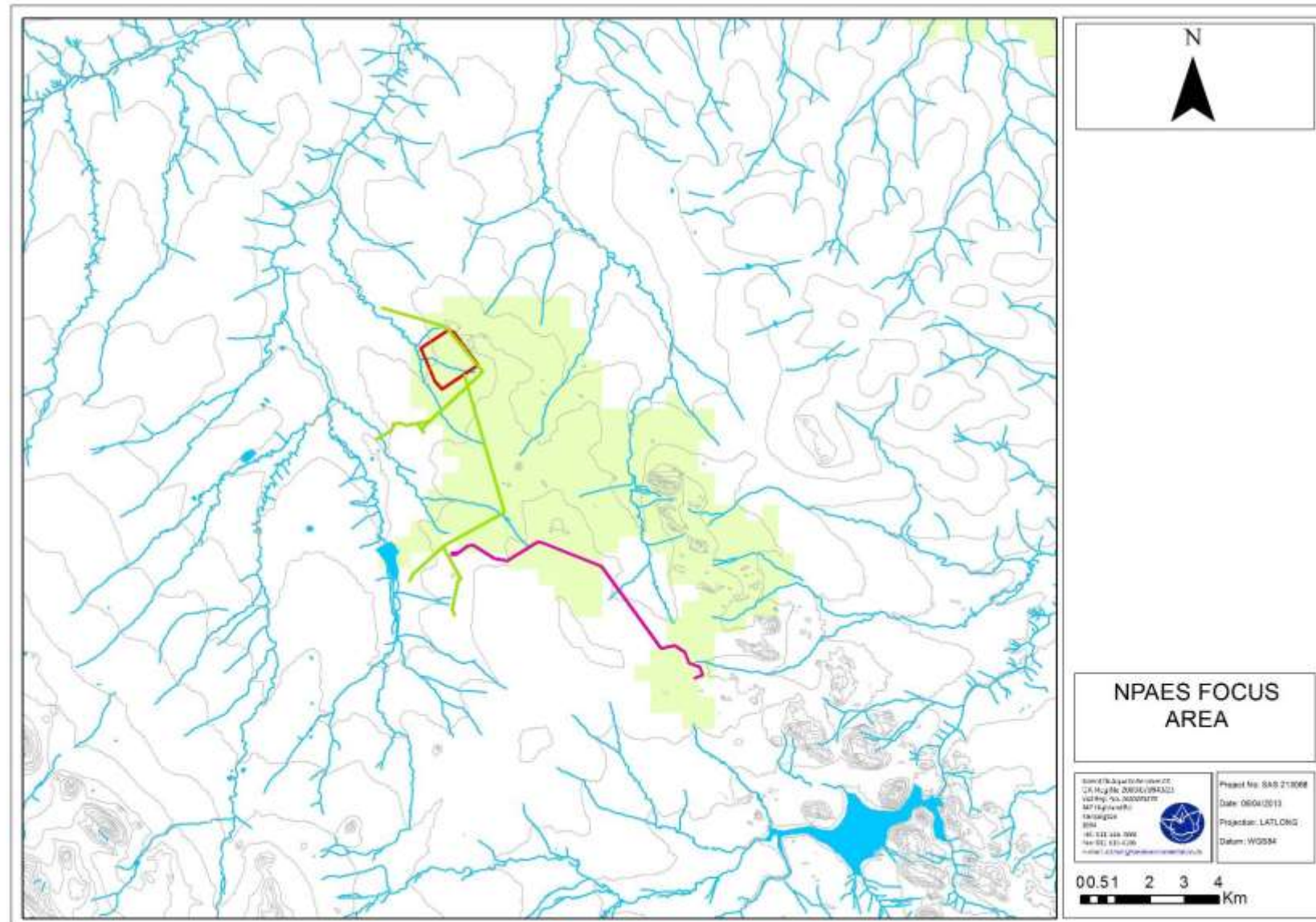


Figure 5: Areas associated with the study area that are earmarked as NPAES focus areas (indicated in green).



### **3.4 Importance According to the North West Province Biodiversity Conservation Assessment (2009)**

Areas within the immediate vicinity of the study area were assessed using the North West Province Biodiversity Conservation Assessment done in 2009<sup>4</sup>.

The purpose of the North West Province Biodiversity Conservation Assessment was to finalise the Biodiversity Conservation Assessment (Version One) for the North West Province which is to be used to inform the development of the Provincial Biodiversity Sector plans, bioregional plans, and also be used to inform Spatial Development Frameworks (SDFs), Environmental Management Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and in the Environmental Impact Assessment (EIA) process in the province.

The North West Province Biodiversity Conservation Assessment summarises the results of the biodiversity assessment conducted.

The North West Province is very rapidly approaching a critical threshold (60% natural habitat remaining) in terms of the state of biodiversity within the province. Lack of capacity, resources and biodiversity information, and significantly under representative protected area network in the province is hampering the province's ability to effectively manage biodiversity in this rapidly changing landscape. This biodiversity assessment through the development of a critical biodiversity area map for the province is aimed at assisting biodiversity and land use managers and decision makers in this demanding task.

The maps below indicate the location of the study area with reference to each environmental concern or finding as depicted in the Biodiversity Conservation Assessment. No special species of high conservational significance are indicated to occur in close vicinity of the study area (Figure 6). Small areas considered special habitat, namely 'Bare areas special lithology' seem to occur within or directly adjacent to the study area. Ecosystem status indicated for the study area surroundings are vulnerable, due to the Marikana Thornveld vegetation type being considered vulnerable (Figure 7).

The land cover map (Figure 8) indicates large areas of natural vegetation within and adjacent to the study area with small transformed areas scattered throughout. Critically endangered rivers (Figure 9) are not indicated to fall within the immediate vicinity of the study area.

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<sup>4</sup> Technical report version 1 compiled by the Department of Agriculture, Conservation, Environment and Rural Development.



Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The study area is located within a terrestrial CBA and the sewage line of the study area is indicated to cross an aquatic ESA and CBA (Figure 10).

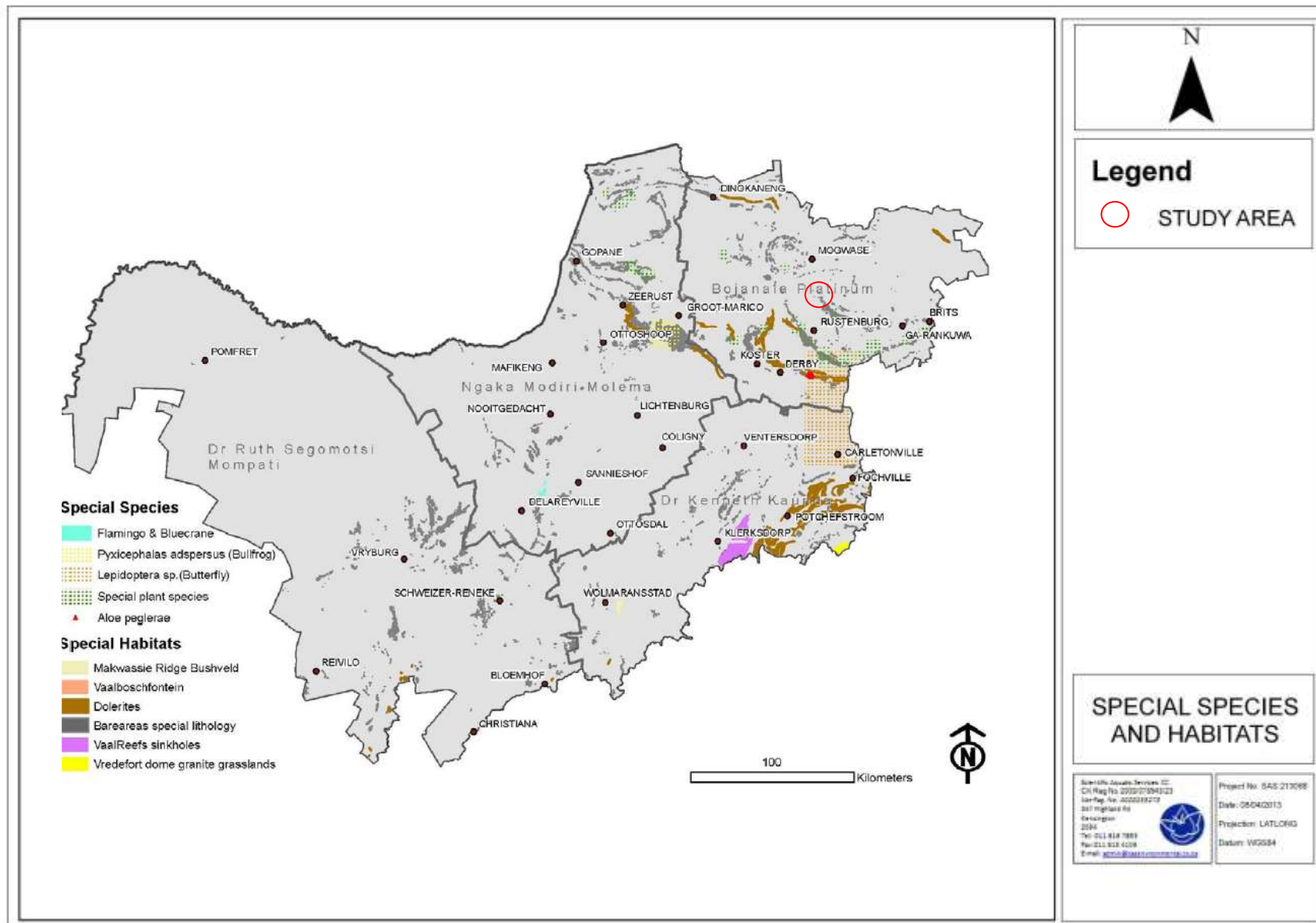


Figure 6: Expert mapped features; location of study area depicted by a red circle.



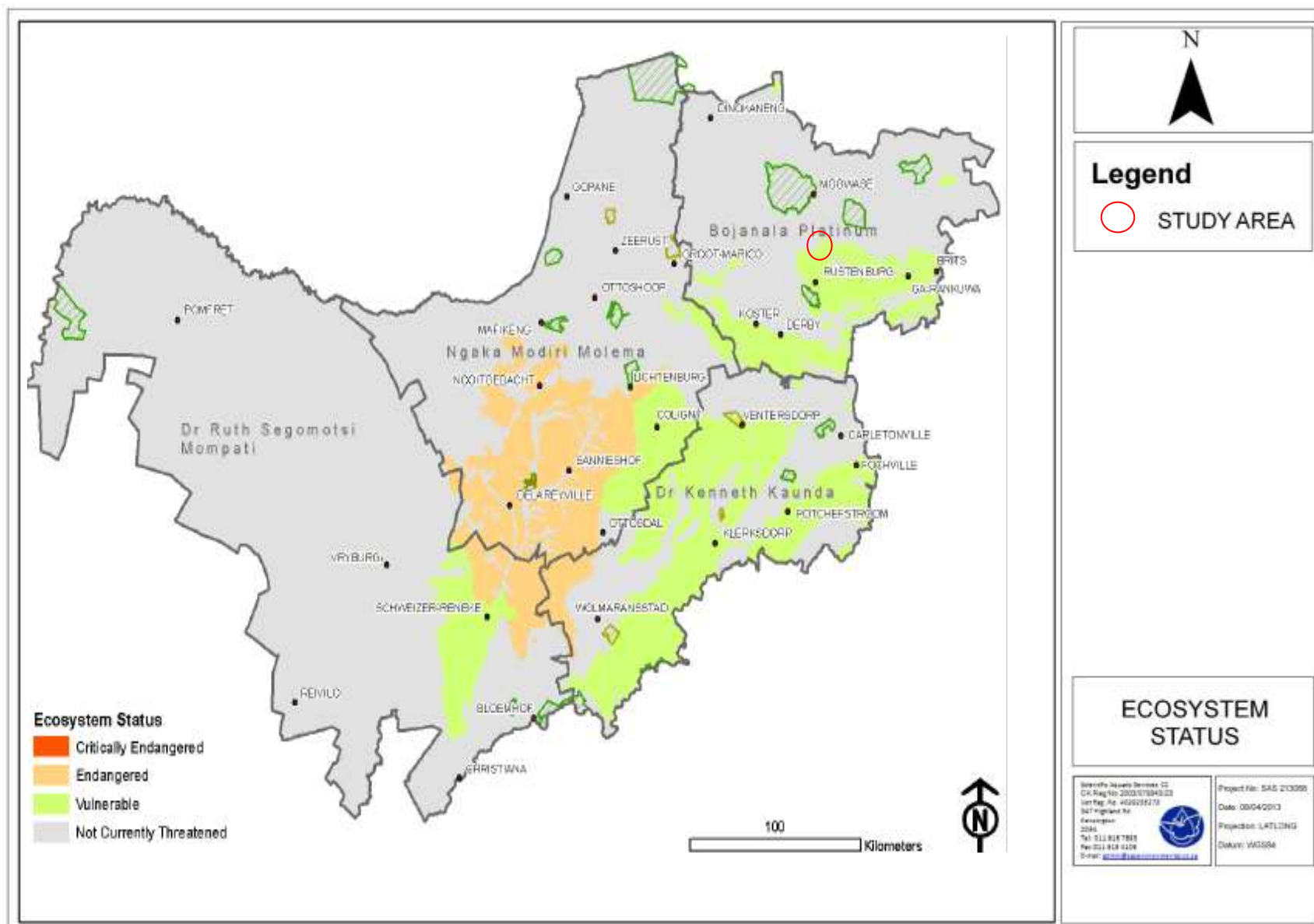


Figure 7: Ecosystem Status; location of study area depicted by a red circle.



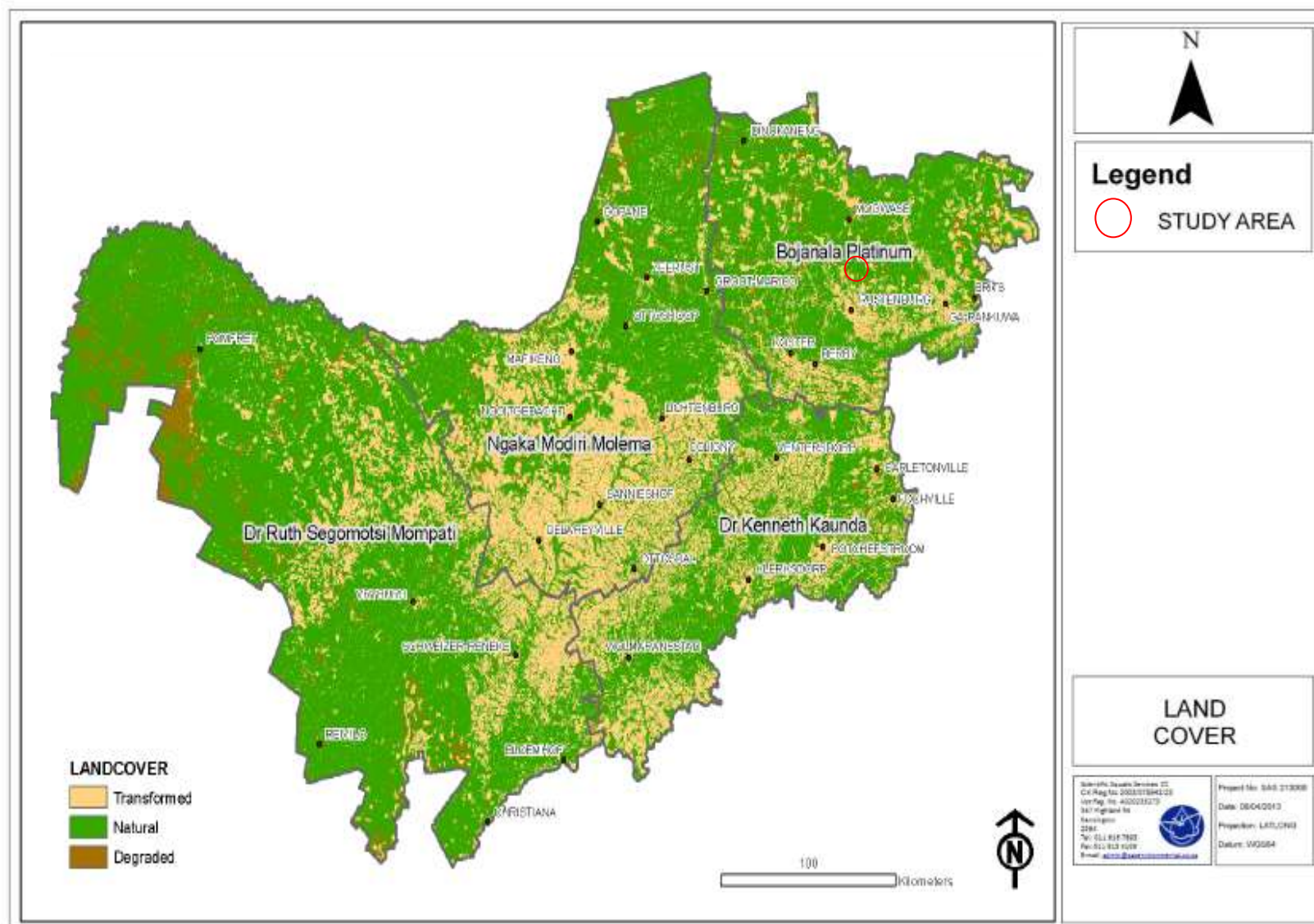


Figure8: Landcover of the North West province; location of study area depicted by a red circle.



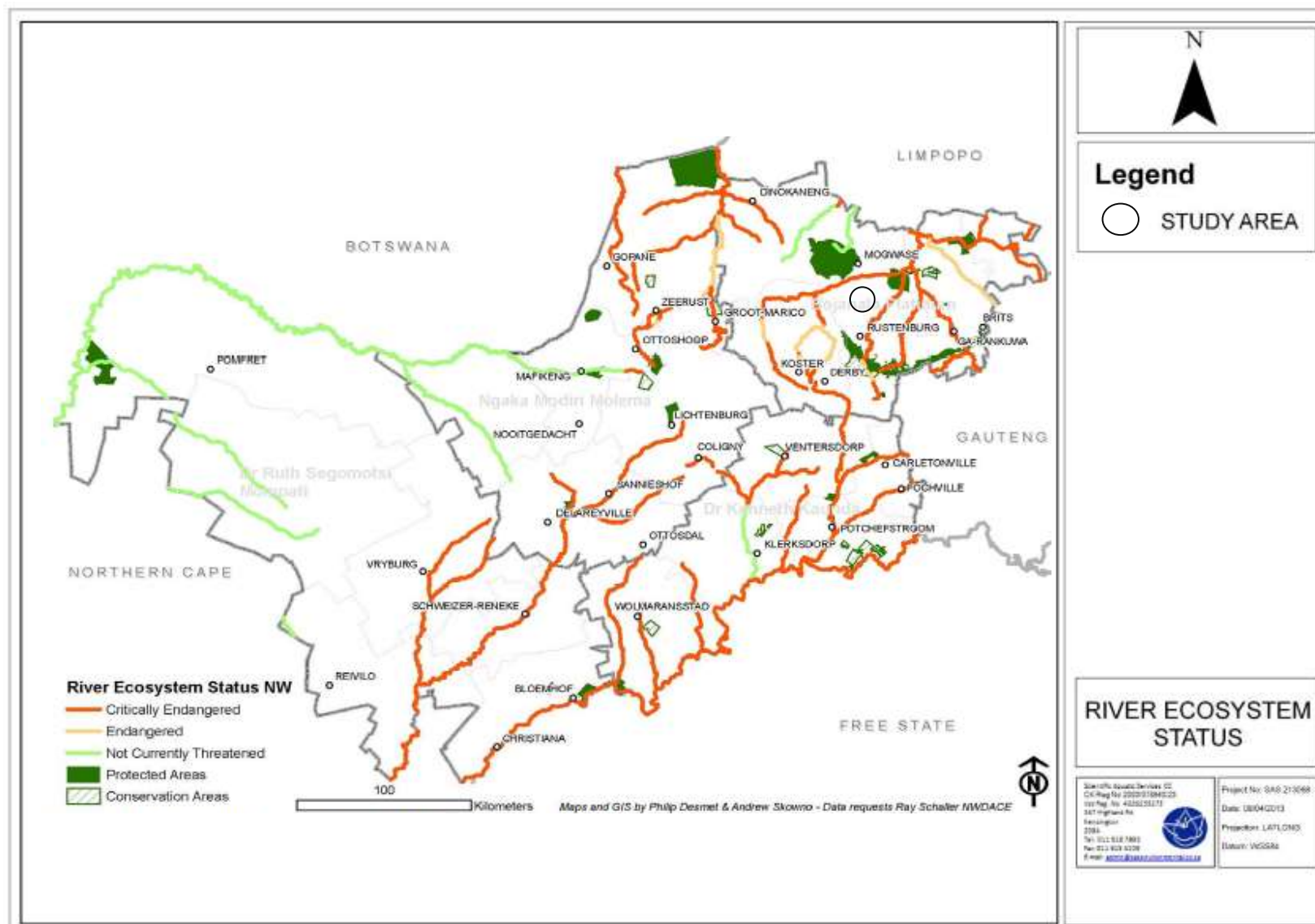


Figure 9: Provincial Ecosystem Status of main-stream rivers; location of study area depicted by a black circle.





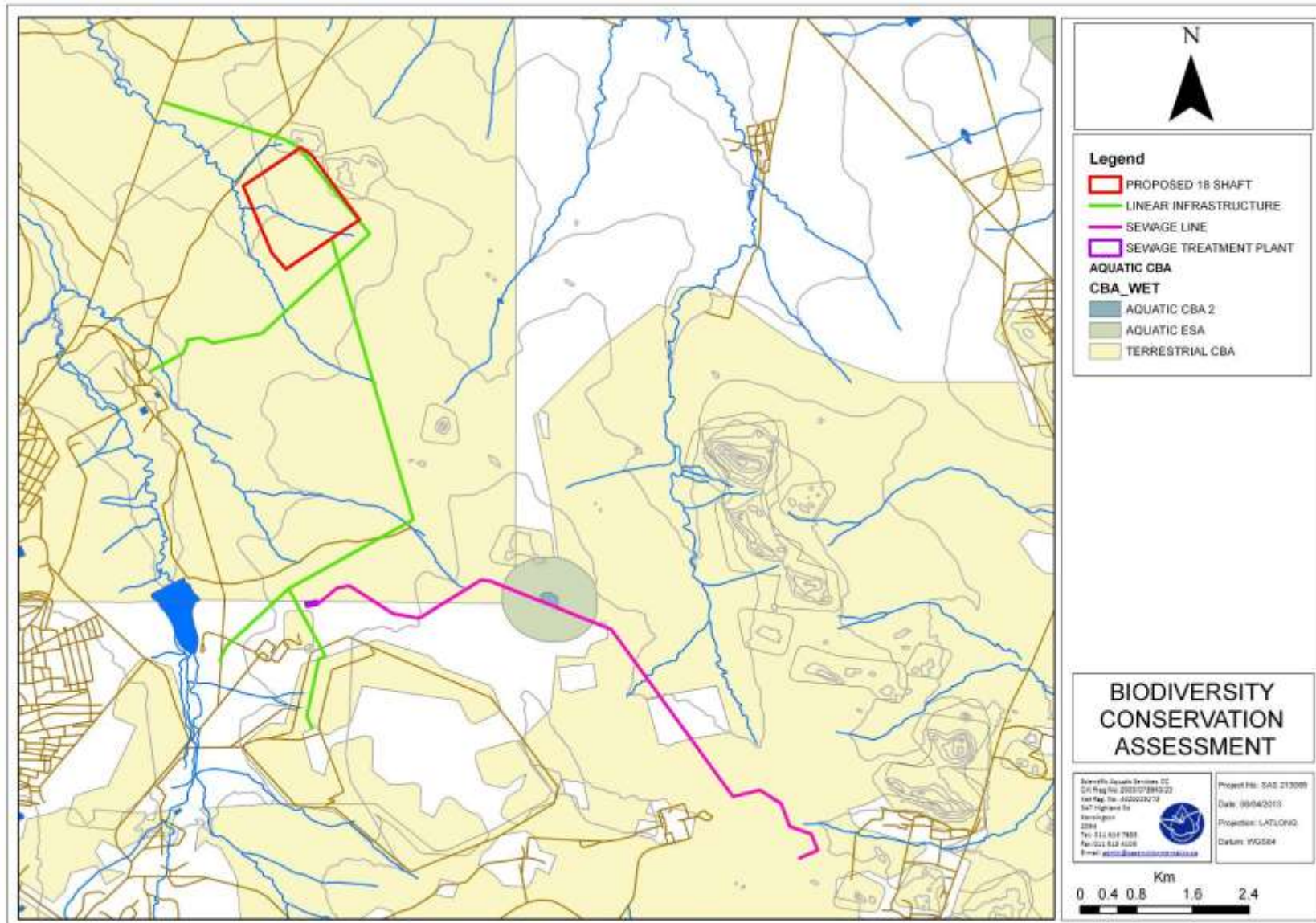


Figure 10: Terrestrial and aquatic CBA and ESAs associated with the study area.





### **3 SURROUNDING PROPERTIES/LAND USES**

The study area is in a rural area characterised by agricultural activities and mining operations. Historically much of the area was utilised for agricultural activities with special mention of maize, sunflower and tobacco production. With the increase in value of platinum group metals significant increases in the amount of mining taking place in the area occurred. With the transformation taking place in the area due to these activities, significant local and fairly regional loss of biodiversity has taken place. In addition there has been a significant increase in the impact on water quality and wetland and aquatic resources in the area. For this reason the need to minimise the impact of proposed development activities on the remaining natural resources in the area is deemed to be of high significance. This report aims to ensure that these aspects are adequately considered during the decision making process for the proposed mining development in question.

### **4 STRUCTURE OF THE REPORT**

Section A of this report served to provide an introduction to the study area, the general approach to the study as well as the method of impact assessment. Section A also presents the results of general desktop information reviewed as part of the study including the information generated by the relevant authorities as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character. The section also indicates that the requirements for mitigation, monitoring and rehabilitation are addressed in each section.

Section B addresses all the issues pertaining to the assessment of the floral ecology of the study area.

Section C addresses all the issues pertaining to the assessment of the faunal ecology of the study area.

Section D addresses all the issues pertaining to the assessment of the wetland ecology of the study area.



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