

15 APRIL 2012

**VUNENE MINING (PTY) LTD– USUTU COLLIERY
OPEN-CAST AND UNDERGROUND COAL MINING**

Biodiversity and Ecological Assessment

**Project Number: USU-ECO-325d
Revision: 01/ 08 May'12**

**Distribution:
1x Copy VUNENE (Pty) Ltd
1X Copy ENVASS**



ECOLOGICAL REPORT



Authored by:

**VUYOKAZI APRIL (PR.SCI.NAT.)
ENVIRONMENTAL SPECIALIST**

ENVIRONMENTAL ASSURANCE (PTY) LTD.

394 Tram Street
New Muckleneuk
Pretoria
0181

Phone: 012-460-9768

Fax: 012-460-3071

E-mail: vuyo@envass.co.za

www.envass.co.za

"Your Partner in Calculating Environmental Solutions"

ENVASS 
ENVIRONMENTAL ASSURANCE (Pty)Ltd

1. Foreword

This Biodiversity and Ecological Assessment study was undertaken as part of the Environmental Impact Assessment (EIA). The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Environmental Impact Assessment Regulations of 2010 (Government Notice No's R543, 544 and 545 in Government Gazette No 33306 of 18 June 2010) As corrected by "Correction Notice 1" (GN No. R. 660 of 30 July 2010) and "Correction Notice 2" (GN No. R. 1159 of 10 December 2010).

This study was done for: Environmental Assurance (PTY) LTD

Name : Ilze Ueckermann

Designation : Senior Environmental Consultant

Date : 19-20 January and 16-17 April 2012

Signature : 

Quality control and review was done by:

Name : Retha Weir

Date : 17 May 2012


Signature : 

This report was reviewed and approved by:

Name : Henno Engelbrecht

Designation : Programme Manager

Date : 28 May 2012

Signature : 

2. Executive Summary

Environmental Assurance (Pty) Ltd (Envass), as an independent environmental consultant have been appointed by Vunene Mining (Pty) Ltd to undertake an Environmental Impact Assessment (EIA) for the proposed coal mining at USUTU Colliery. The proposed activity is aimed to take place on the following farms, namely:

- ❖ Jan Hendriksfontein 263IT,
- ❖ Witpunt 267IT,
- ❖ Leeuwenburg 137IT,
- ❖ Holbank 265IT,
- ❖ Transutu 257IT,
- ❖ Mooiplats 290IT,
- ❖ Roodewal 270IT and
- ❖ Vlakfontein 266IT and 269IT.

The work plan proposed is a combination of open cast and underground mining of certain portions of the above mentioned farms. An activity of this magnitude entails that the Environmental Impact Assessment (EIA) be conducted in terms of National Environmental Management Act (no 107 of 1998).

As part of the EIA requirements, an ecological assessment was conducted and the study aimed to assess the occurrence and diversity of flora and fauna species associated with the site, the ecological functionality and conditions that influence the area's ecosystems interactions. This report presents the findings obtained following desktop research and field work undertaken within the study area.

The USUTU Colliery is located in the Msukaligwa Local Municipality (MP302) 5-10 kilometers south East of Ermelo in the Mpumalanga Province. From a biodiversity point of view, the area has no formal land base protected areas, thus it has been prone to extensive natural habitat loss due to land-use activities within the area.

The study has found and concluded that the proposed mining activity will cause a significant environmental impact to the remaining natural environment. The study area contains numerous wetlands types. A few of those wetland types, mainly the floodplains still maintain their functionality and offer a series of species ecological important ecosystem services. These include their use as breeding sites and as general species habitat.

The proposed activity will include the removal of vegetation thus causing habitat loss for species such as African grass owl. The obstruction of water flow would result in wetland drainage or dryness which will prevent species functioning, mainly for birds

that use this environment for breeding and migratory purposes. Further disturbance to the area will lead to more alien species invasion and remaining natural area loss.

It is therefore recommended that the proposed mining, should it be authorized, includes rehabilitation, especially of wetlands in their Environmental Management Plans. Furthermore, there should be an allowance for species movement by leaving strips of natural vegetation that would serve as corridors for species movement. The client should adhere to the buffering zones recommended by the specialists. Lastly, further monitoring of the ecological function pre and during mining should be considered in order to maintain and manage the biodiversity of the area prior to rehabilitation.

Due to the intensity of land-use activity in the area, it should be understood that the cumulative environmental impacts on the area are the results of the combination of the agricultural, infrastructure and mining activities in the vicinity. Therefore, it is important to consider the severity of each activity and where they interlink in order to implement a correct ecological management of the area.

3. Declaration of independence

This study was conducted by Vuyokazi April in her capacity as flora and fauna specialist for the Environmental Assurance (Pty) Ltd (**Envass**). Envass is an independent consultant to Vunene Mining (Pty) Ltd. – USUTU Colliery and has no business, financial, personal or other interest in the activity, application or appeal in respect of which they were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work.

Miss April is registered with the South African Council for Natural Scientific Professions (SACNASP) (400260/11) as a biological scientist and has six years of combined experience in conducting EIA of exotic introduced plants and insects on indigenous flora and fauna; and as a biodiversity conservation planner.

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.



Vuyokazi April (PrSciNat)

3.1 Project Team:

Team Members	Field	Qualifications
Vuyokazi April	Biological Sciences and Ecology	MSc in Natural Science (majoring with Zoology and Entomology), Registered SACNASP member 400260/11
Emile van Druten	Ecology and Project Management	MSc in Project Management
Henno Engelbrecht	Project Management	Hons. Environmental Management

4. Contents

1. FOREWORD	1
2. EXECUTIVE SUMMARY	2
3. DECLARATION OF INDEPENDENCE	4
3.1 PROJECT TEAM:.....	4
5. ACRONYMS	7
6. INTRODUCTION	8
7. TERMS OF REFERENCE	10
7.1 DESKTOP RESEARCH AND LITERATURE REVIEW	10
7.2 SITE SCREENING OR GROUND TRUTHING.....	10
7.3 FIELD SURVEY AND SAMPLING.....	10
8. OBJECTIVES AND SCOPE OF THE STUDY	11
8.1 OBJECTIVES	11
8.2 SCOPE OF THE STUDY	11
9. METHODOLOGY	12
9.1 DESKTOP STUDY	12
9.2 FIELD ASSESSMENT.....	13
10. APPLICABLE LEGISLATION	14
11. SITE DESCRIPTION	15
11.1 THE PROVINCE	15
11.2 THE LOCATION	15
11.2.1 Geology	15
11.2.2 Hydrology	16
11.2.3 Vegetation.....	16
11.3 PROJECT DESCRIPTION	16
12. STUDY ASSUMPTION AND LIMITATION	19
13. FINDINGS AND RESULTS	20
13.1 VEGETATION COMMUNITIES	20
13.2 FLORA COMMUNITIES	26
13.3 FAUNAL COMMUNITIES.....	35
14. SPECIES OF SPECIAL CONCERN	41
14.1 FLORA 41	
14.2 FAUNA 41	
14.2 ALIENS AND INVASIVES.....	43

15. ENVIRONMENTAL IMPACTS AND RECOMMENDATIONS.....	44
16. REFERENCES.....	46
17. ANNEXURE.....	48
17.1 IUCN CATEGORIES (SOURCE: WWW.IUCNREDLIST.ORG).....	48
17.2 IMPACT ASSESSMENT CATEGORIES.....	48
17.3 INPUT SPATIAL LAYERS.....	49
17.4 SOFTWARE USED.....	49
17.5 ASSESSMENT OF PLANT SPECIES.....	49
17.6 ASSESSMENT OF FAUNA.....	49
18. GLOSSARY.....	50
19. APPENDICES.....	52
APPENDIX 1: LIST OF INTERNATIONAL AGREEMENTS AND FRAMEWORKS FOR BIODIVERSITY CONSERVATION AND MANAGEMENT.....	52
APPENDIX 2: LIST OF SOUTH AFRICAN LEGISLATION PERTAINING TO THE BIODIVERSITY CONSERVATION AND MANAGEMENT.....	54
APPENDIX 3: LIST OF POLICY AND FRAMEWORKS ASSOCIATED WITH BIODIVERSITY CONSERVATION AND MANAGEMENT.....	58
APPENDIX 5: FLORAL DIVERSITY SNAPSHOTS OBSERVED WITHIN AND AROUND USUTU MINING AREA.....	64
APPENDIX 6: ANIMAL HOLES, SPOORS AND DROPPINGS OBSERVED AT USUTU.....	71
APPENDIX 7: ENVIRONMENTAL IMPACTS ASSOCIATED WITH MINING OBSERVED AT USUTU.....	73

List of Tables and Figures

Table 1: Environmental Data Sources.....	12
Table 2: South African ecological zones and their conservation status.....	21
Table 3: The twelve vegetation types under most pressure from mining potential ranked from highest to lowest and the mining pressure from high to medium (Rouget et.al., 2004).....	22
Table 4:- List of flora observed in the study area.....	29
Table 5:- List of fauna observed in the study area, their conservation status is based on the Red list categories of 2011.....	38
Figure 1: USUTU Colliery locality map.....	9
Figure 2: Hierarchy of Biodiversity legislation, policies and programmes (adopted from Kunttonen-van't Riet, 2007).....	14
Figure 3: Site description map.....	17
Figure 4: Portions that falls within the USUTU Colliery mine boundary.....	18
Figure 5: South African biome distribution (Mucina & Rutherford, 2006).....	20
Figure 6: Vegetation types that falls within the study area.....	22
Figure 7: National Spatial Biodiversity Assessment considers the remaining natural ecosystem status where USUTU Colliery is situated endangered -Vulnerable (NSBA, 2004).....	23
Figure 8: The Mpumalanga Terrestrial Ecosystem Biodiversity Conservation Plans which designate the remaining natural vegetation types of the study site as highly significant (MPBCP, 2006).....	24

Figure 9: Transects and visual observation sampling points	26
Figure 10: South African taxa of conservation concern (source SANBI, 2011)	37
Figure 11: South African Ecosystem status (source: SANBI, 2011).....	43

5. Acronyms

AIP's	– Alien and Invasive Plants
BGIS	– Biodiversity Geographical Information System
BLSA	– Bird Life South Africa
CARA	– Conservation of Agricultural Resource Acts
ECA	– Environmental Conservation Act
EIA	– Environmental Impact Assessment
EMP	– Environmental Management Plans
Envass	– Environmental Assurance
IUCN	– International Union for the Conservation of Nature
MPBCP	– Mpumalanga Biodiversity Conservation Plans
NBA*	– National Biodiversity Assessment formerly known as National Spatial Biodiversity Assessment (NSBA)
NBSAP	– National Biodiversity Strategy and Action Plans
NEMA	– National Environmental Management Act
NEMBA	– National Environmental Management Biodiversity Act
NEMPAA	– National Environmental Management Protected Areas Act
NFEPA	– National Freshwater Ecosystem Priority Areas
POSA	– Plants of South Africa
PRECIS	– Pretoria Computerised Information Systems
PrSciNat	– Registration as a Professional Natural Scientist
QDS	– Quarter degree square
SABAP2	– South African Bird Atlas Phase 2
SABCA	– South African Butterfly Conservation Assessment
SACNASP	– South African Council for Natural Scientific Professions
SANBI	– South African National Biodiversity Institute
SARCA	– South African Reptile Conservation Assessment
SIBIS – SABIF	– SANBI's Biodiversity Information System
ToR	– Term of Reference
TSP	– Threaten Species Programme
UCT-ADU	– University of Cape Town – Animal Demographic Unit

6. Introduction

Biodiversity forms the most crucial environmental aspects and is used to formulate decision makings pertaining to activities with significant environmental impacts. The inclusion of biodiversity on decision making has been aimed to bridge a gap between economic development and land destruction. It is used to assist in mitigating the environmental effects these developments may pose whilst maintaining a functioning biodiversity (Driver *et al.*, 2005). Therefore, as part of the Environmental Impact Assessment guidelines it is important to assess the potential impact of any proposed activity listed in terms of section 52 of the National Environmental Management Biodiversity Act 10 of 2004 if it poses direct or indirect impacts to the receiving environment.

In general, biodiversity represents the variety of species within a specified ecosystem and can thus be used to assess the ecosystem health. The importance of biodiversity is not limited to its species diversity but also includes number of ecosystem goods and services offered. As useful and precious as biodiversity might be, it has been severely impacted by socio-economy activities, resulting in some organisms and species becoming extinct or critically threatened. Some of these activities requires removal or alteration of vegetation and soil in the project areas, thus depriving the animals and plants their habitats to thrive in. With this knowledge in mind, efforts to align the importance of biodiversity and also maintain the socio-economic development needs, requires a thorough assessment. This would help to weigh the different impacts land use developments inflicts on the environment in order to make sustainable ecological and social decisions (Driver *et. al.*, 2005, Ferrar & Lötter, 2007).

This document prepares to report on the biodiversity and ecological assessment done for Vunene Mining (Pty) Ltd by Environmental Assurance (Pty) Ltd on selected farm portions of Jan Hendriksfontein 263IT, Witpunt 267IT, Vlakfontein 266IT and 269IT, Holbank 265IT, Mooiplats 290IT, Leeuwenburg, 137IT, Transutu 257IT and Roodewal 270IT in Msukaligwa Local Municipality, Mpumalanga (Figure 1). The assessment entailed the investigation of the biome, dominating vegetation types and, flora and fauna species present in the vicinity of the proposed activity. The aim was to ascertain the possibility of sensitive species occurrence, their ecological status, the distribution and presence of any Red list ecological data associated with the study area that would be affected by the proposed activity. As a result, offer possible ecological recommendations and alternatives to mitigate the environmental impacts that the proposed activity might pose. This report will be incorporated into the Environmental Impact Assessment (EIA) report for the proposed Usutu Colliery coal mining application.

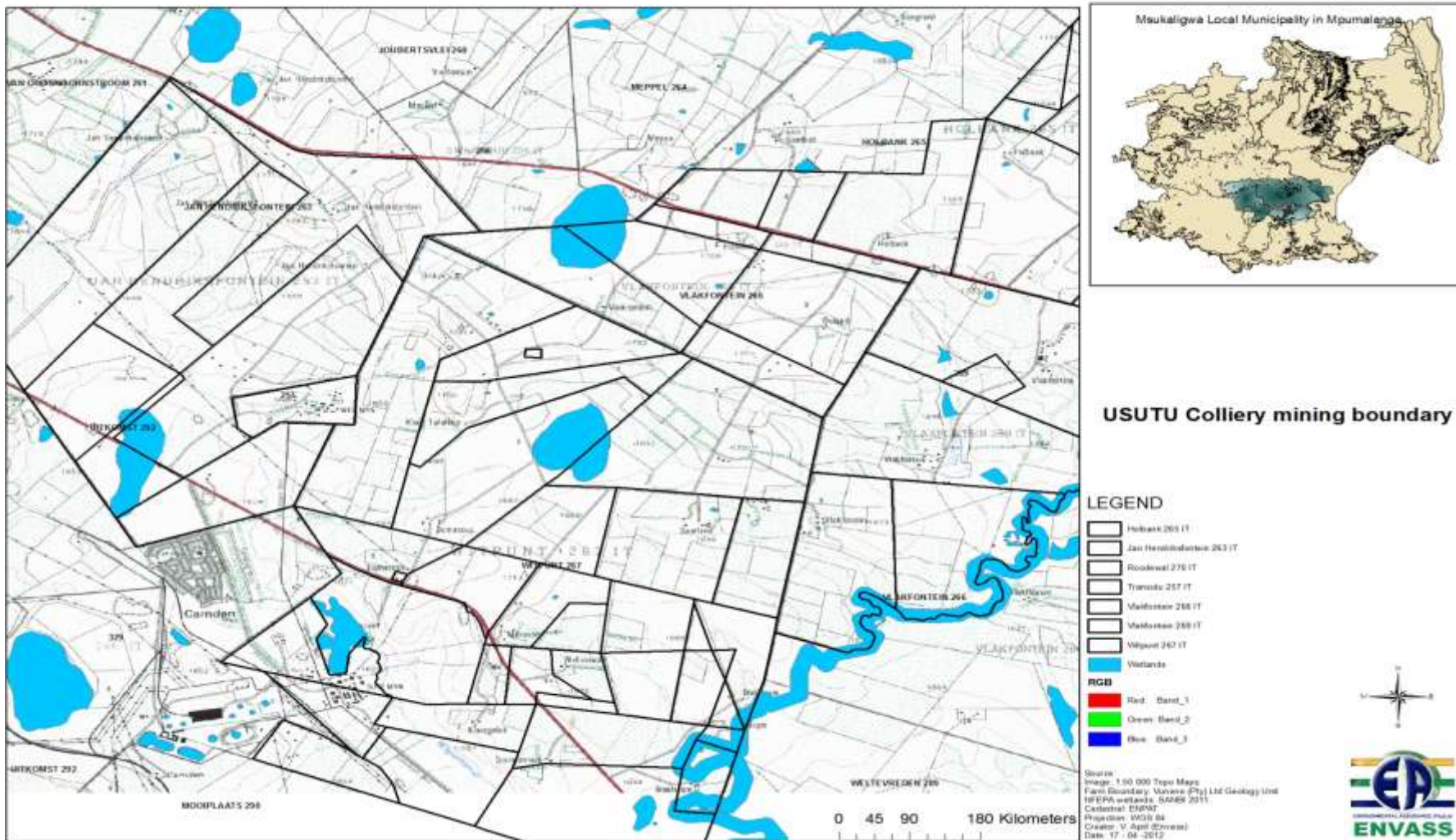


Figure 1: USUTU Colliery locality map

7. Terms of Reference

To comply with the requirements of the Provincial Authorities, Departmental divisions and regional requirements, the Terms of Reference (ToR) for this project the report entailed three (3) components viz:

7.1 Desktop research and literature review

The available provincial biodiversity data sets, red listed fauna and flora data, species conservation status data and, relevant legislation and policies information were researched and included for constructive environmental impact assessment conclusion. Previously conducted studies for proposed activities on the site and in the region were reviewed and used as references (e.g. The Natural Scientific Services Biodiversity Assessment Reports) to give the hawk eye view of the area before the proposed activity. The specialist also liaised and communicated with relevant sectors whose mandate it is to conserve and be custodians of biodiversity. Maps and any spatial data on biodiversity (where available) were used to determine the species occurrence, distribution and status.

7.2 Site screening or Ground truthing

The site visit to understand the magnitude of the impact that the proposed activity will have was conducted on the 19-20 January 2012 for Jan Hendriksfontein 263IT, Transutu 257IT, Witpunt 267IT and Vlakfontein 266IT. Farms Holbank 265 IT, Vlakfontein 269IT, Mooiplaats 290 IT and Leeuwenburg 137 IT were screened 16-17 April 2012. These visits were also used to verify if the results yielded by the desktop research and other reference material were significantly accurate and whether there were any other changes (macro or micro) in the area that had not yet been documented. This component entailed a visual assessment of the area, monitoring of species activities and other activities taking place within or adjacent to the proposed project area. Lastly, the sites visit also permitted the opportunity to identify and observe species that the desktop study mentioned.

7.3 Field survey and sampling

This component aimed to assess terrestrial biodiversity by visual observations and by using transects to measure floral species distribution. The visual observations were conducted during different time intervals (i.e. morning, noon/afternoon and in the evening) to ensure all faunal activity patterns were covered. Flora and fauna observed during this component were recorded and the results were compared with the desktop reviews and used to conclude on the ecological sensitivity of the area with regards to the proposed activity. This particular assessment was done on the 19-20 January, 14-15 March, 16-17 April 2012 and 19-20 July 2012.

8. Objectives and Scope of the study

8.1 Objectives

The objectives of the study were:

- ❖ To assess the current status of the habitat components and its conservation status
- ❖ To identify the floral species on site and to recommend steps to be taken should a Red list or protected species be found
- ❖ To identify the fauna species on the site and to recommend steps to be taken should a Red list species be found
- ❖ To highlight the potential impacts the development may have on the ecosystem components of the study area
- ❖ Provide management recommendation to mitigate negative impacts and enhance positive impacts of the proposed activity

8.2 Scope of the study

This report

- ✓ List flora identified during the study
- ✓ List fauna identified during the study
- ✓ Comment on the ecological/conservation status of both the flora and fauna observed in the study site
- ✓ Offer recommendation regarding preservation of the indigenous and protected plant species found in the site
- ✓ Offer recommendation to reduce and minimise impacts associated with the proposed activity.

9. Methodology

9.1 Desktop study

The desktop study yielded the lists of plant and animal species occurring on the USUTU Colliery proposed mining activity boundary and within the quarter degree squares (QDS) **2630CA** and **2630CB** of the Msukaligwa Local municipality in Mpumalanga Province. The list includes the plants and the animals that are endemic, their occurrence, those who use the area for breeding, nesting or foraging purposes and those whose distribution extends towards the area. The data was sourced from a wide range of conservation agency listed in (Table 1) and was used to generate the fauna and flora species checklists for the area of study.

Table 1: Environmental Data Sources

Source	Data	Purpose	Accessed
SANBI	Vegetation Map (2006)	Spatial layer of vegetation types occurring within the country, Lesotho and Swaziland. For this specific analysis we looked at the vegetation of Mpumalanga Province. South Africa.	17 January 2012
	PRECIS-POSA	Provided the checklist of all the plant species endemic and occurring within QDS 2630CA and 2630CB	Download from POSA (http://posa.sanbi.org) on February 2, 2012, 1:39 pm
	BGIS	Obtain spatial layers for Mpumalanga Biodiversity Conservation Plans and NFEPA wetlands shape file	17 January 2012
	SIBIS-SABIF	Provided a checklist of the SARCA for QDS 2630CA and 2630CB	17 January 2012
	TSP	A collaboration with SANBI to provide a Red data list of threaten floral species	17 January 2012
UCT-ADU	SABAP2	Provided a checklist of observed Bird species in QDS 2630CA and 2630CB	30 January 2012
	SABCA	Checklist for South African	2012/02/02

Butterflies and those occurring in QDS **2630CA** and **2630CB**

Google	Google Earth	Generate the site maps	2012/03/02
	Google Chrome	Accessed for literature review and related information pertaining the proposed activity	2012/03/02 -2012/03/14
Bird Life South Africa	BLSA	Generated a birds of Mpumalanga checklist	17 January 2012

9.2 Field assessment

The site was visited and reviewed to determine the various plant communities occurring on the site. Plots were selected at random using a 100 meter measuring tape. Vegetation cover was inspected at every 2 meter for plants falling inside a 1m quadrant. The plants species observed were identified, categorized according to the growth form, habitat type and conservation status. Ground laying plants within the quadrant were inspected by paddling through tall grass species to expose the underlying vegetation. All observed species were recorded and samples were taken for further identification.

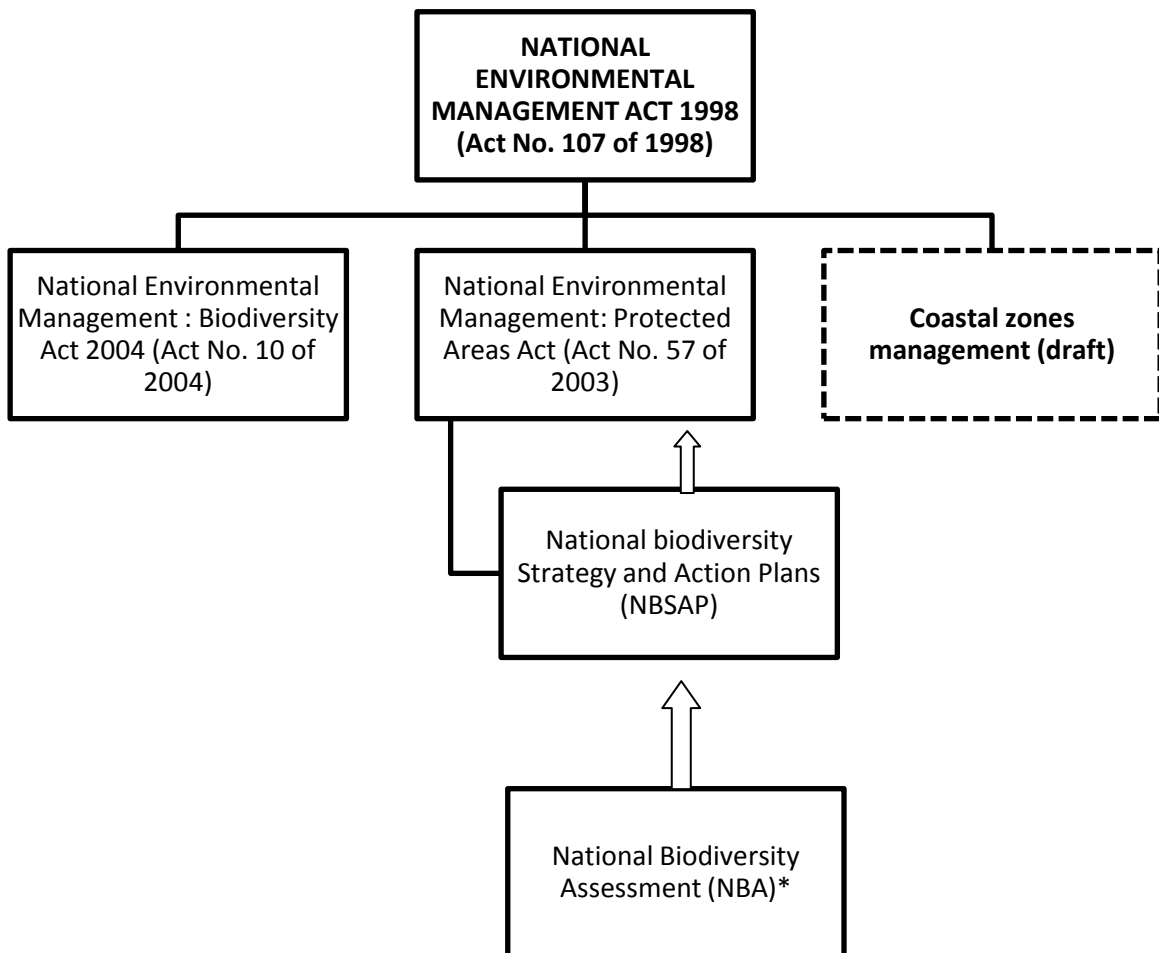
Due to the extent of the mining area, the survey was done mostly on foot and via driving using a motor vehicle. This provided an opportunity to visually assess the faunal species that might use the site as their habitat and those occurring within the study area. The Avian population was assessed visually and identified using Sasol Birds of Southern Africa (Sinclair *et. al.*, 2002), South African Bird Atlas Phase 2 and Bird Life South Africa for species occurring in the area. Animals and small mammals where identified within the study site using sitings, spoor, tracts, signs and droppings as well as holes and nesting sites on the grounds where possible.

The butterflies observed on the site were also identified and recorded with further identity verification done using South African Butterflies Conservation Assessment list for the Lepidopterans occurring in the quarter degree squares (QDS) 2630CA and 2630CB.

Reptiles and amphibians were not encountered although they were looked out for. Personal communication with farmers around the area and consultation of relevant conservation lists was conducted as part of the assessment to verify species occurrence in the area as noted in the Natural Science Services study (Usutu Eskom Biodiversity Assessment 2010/2011). All the observed flora and fauna species were identified, recorded and used to compile the ecological impact assessment report.

10. APPLICABLE LEGISLATION

Certain legislation, policies and programmes' regulations (see Appendice 1, 2 and 3) offer guidelines for integrating biodiversity assessments in Environmental Impact Assessment. Below is a hierarchy of the most important biodiversity legislations, policies and programmes that are accountable for biodiversity conservation and management in the country (Figure 2). These are therefore applicable to every environmental aspect assessed for this study.



*National Biodiversity Assessment (NBA) used to be known as National Spatial Biodiversity Assessment (NSBA)

Figure 2: Hierarchy of Biodiversity legislation, policies and programmes (adopted from Kuntonen-van't Riet, 2007)

11. Site Description

11.1 The Province

Mpumalanga province lies in the eastern part of South Africa and constitutes 6.5% of the country's area, thus making it one of the two smallest South African provinces. Mpumalanga, loosely translated as "where the sun rise" is divided into two sub regions namely, the Highveld and the Lowveld, by the Drankesberg mountains. The Highveld is the western part of the province which is cooler and often receives severe frost with temperatures ranging from 23°C-12 °C during summer and 15°C-1°C in winter and the annual rainfall of 878 mm (WeatherSA, 2012). The Lowveld is in the east and subtropical part of the province with average temperatures ranges from 29°C-19°C during summer and 23°C-6°C in winter with annual rainfall of 767mm (WeatherSA, 2012). Furthermore, the Highveld and the Lowveld also possesses a distinct variation in their vegetation; the Highveld is mainly grassland whereas the Lowveld is mostly savanna.

The province boasts diverse and special fauna and flora species and also offers a variety of land use activities such as agriculture and mining. The agricultural sector use more than 68 % of the province for farming activities such as crops, livestock and forestry industries. However, mining is the biggest and most extensive economic activity in the province; various minerals are found and extracted from Mpumalanga including the coal. The coal mining is the biggest mining activity happening in the area with Mpumalanga producing 83% of the countries coal for electricity and synthetic fuel. Mpumalanga is the third largest coal producing and exporting region in the world.

11.2 The location

The project is near Ermelo in the Msukaligwa local municipality (MP302), situated in the Gert Sibande District Municipality in the Highveld sub region of Mpumalanga(S: 25°35'00" and E: 30°05'00"). The municipality occupies 601566 ha of the province with an estimated population of 127 000 (Figure 3). Ermelo is the educational, industrial and commercial centre of the Msukaligwa. Different land use activities such as agricultural mixed farming and different mining activities make Ermelo the hub of immigrants and employment seekers.

11.2.1 Geology

USUTU Colliery mining area is in the Ermelo coalfields of the well known Middle Ecca stage. The coalfields extends from Carolina in the north all the way to Dirkiesdorp in the south encompassing the surface area of 11 250 km². The coalfields comprise sedimentary rocks of the Dwyka formation and Ecca group which is dominated by the Vryheid formation.

11.2.2 Hydrology

The study site area falls within the C11A and C11B Quaternary Catchments of the Vaal River. As a Highveld region of the Mpumalanga province there are numerous endorheic wetlands located in the vicinity of the study site. These wetlands are considered as ecosystems of ecological importance and among the most threaten aquatic habitats in the country (Cowan & van Riet 1998, Ferrar & Lötter 2007). They are known to support variety of floral and faunal species.

11.2.3 Vegetation

The area is highly dominated by grassland a typical feature of a Highveld with six (6) vegetation types occurring in the area, namely the Amersfoort Highveld Clay grassland, Eastern temperate Freshwater wetlands, Eastern Highveld grassland, Soweto Highveld grassland, Wakkerstroom Montane Grassland and KaNgwane Montane grassland (Mucina & Rutherford, 2006). The area in terms of biodiversity is considered sensitive and important to the national and provincial conservation sectors and agencies. The USUTU Colliery is situated in close proximity to small scale operating collieries, agricultural farms and game farms.

11.3 Project description

The Vunene Pty Ltd Mining group's proposed coal mining project plan compromise of underground and open cast coal mining (Figure 4). The underground mining will be achieved by using a board and pillar mining system varying between 80 meters for Vlakfontein 266IT and between 80-120 meters below surface level for the Holbank, Roodewal, Mooiplats and Vlakfontein 269IT. The underground mining is aimed at using continuous miners and the planned production will commence on the West underground main highwall. The opencast mining will be achieved using the truck and shovel lateral roll-over mining method accessed through a 17° pit. The open cast mining would be constructed on certain portions of Jan Hendriksfontein 263IT.

The haul road will be extended to the existing nearby road to access the mining area.

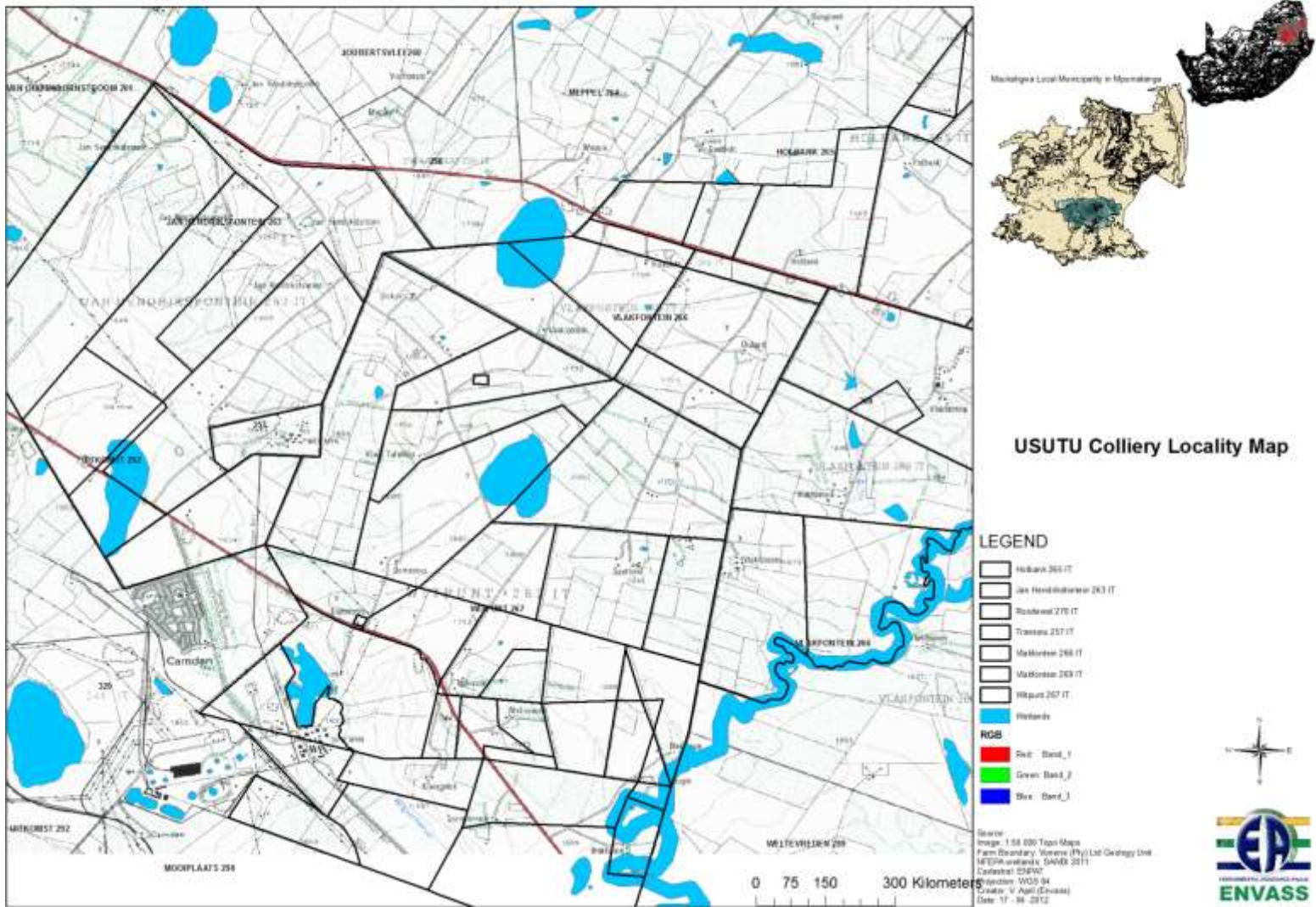


Figure 3: Site description map

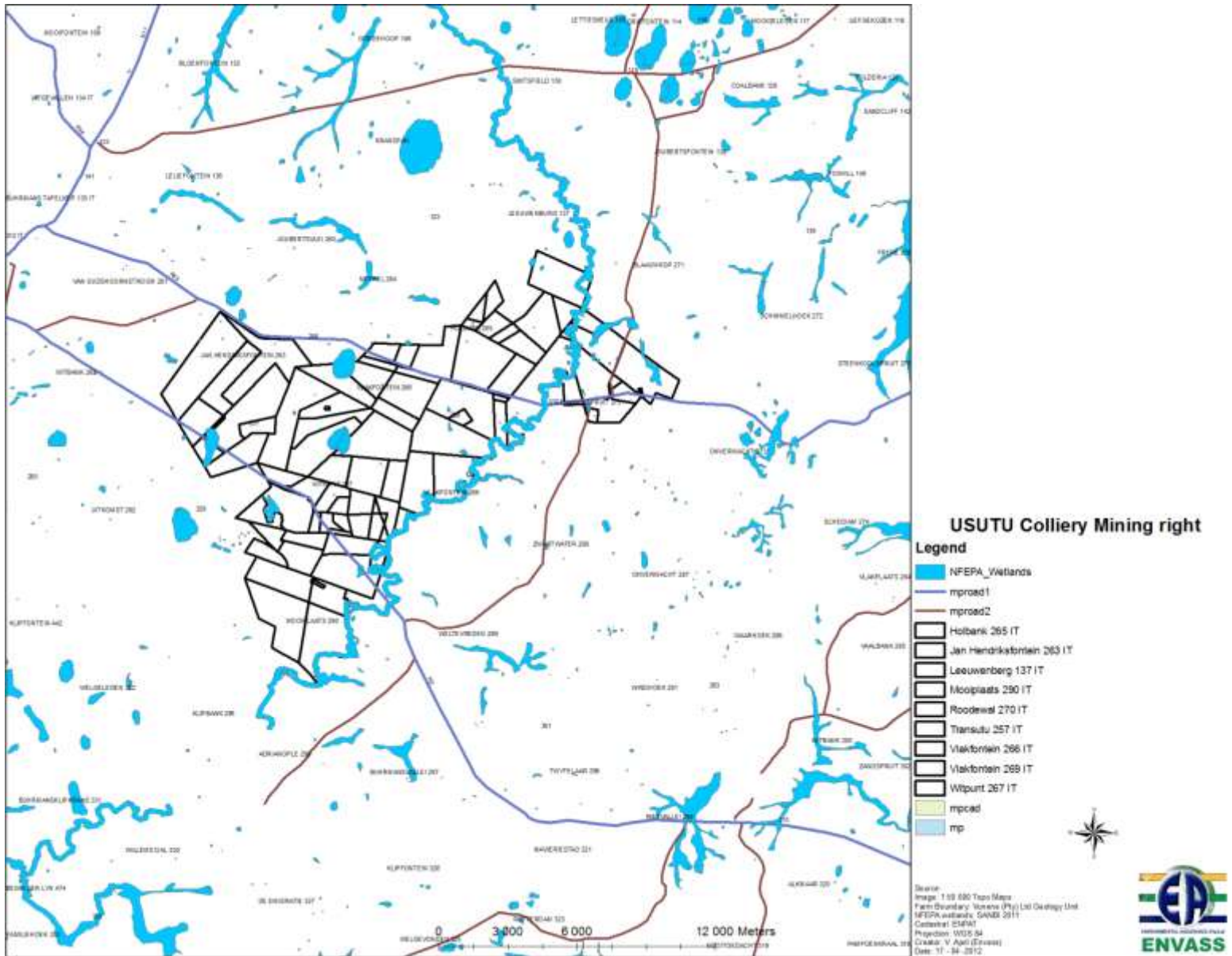


Figure 4: Portions that falls within the USUTU Colliery mine boundary

12. Study Assumption and Limitation

For studies of this magnitude, time always becomes a great constraint. The area harbours faunal species of special concern and is in the vicinity of important freshwater ecosystems. Therefore, it is regarded as highly sensitive due to the chain of interactions between the flora and the fauna within. However, the location (area of study) and the surrounding farms have extensive mixed agricultural activities and are experiencing road development and exploration and mining activities that affect the ecological state of the area.

Furthermore, certain areas that fall within the proposed mining boundary such as Mooiplats 290 IT, Leeuwenburg 137 IT, Roodewal 270 IT and selected portions of the farm Holbank265 IT and Vlakfontein 269IT, Vlakfontein 266IT, Mooiplats 290IT are privately owned. Whereas, Transutu portion served as the colliery offices.

13. Findings and Results

13.1 Vegetation communities

South Africa is home to nine biomes or ecological life zones that are distributed among the nine provinces (Figure 5) and the area in which USUTU Colliery falls is largely dominated by the Grassland biome, a critically endangered and vulnerable eco-zone (Table 2). It occupies the whole area of Ermelo and six vegetation types occur within namely:

- the Amersfoort Highveld Clay grassland,
- Eastern temperate Freshwater wetlands,
- Eastern Highveld grassland,
- Soweto Highveld grassland,
- Wakkerstroom Montane Grassland and
- KaNgwane Montane grassland

The study area where the USUTU Colliery is currently operating is dominated by two of these vegetation types, namely the **Eastern Highveld grassland (GM 12)** and sparsely distributed **Eastern Temperate Freshwater (Azf 3)** (Figure 6). These two vegetation types are listed as **A1 Vulnerable threatened ecosystems** (DEA, 2011). The Eastern Highveld grassland is classified as an **endangered** vegetation type (Rouget et al., 2004; Mucina & Rutherford, 2006, Ferrar & Lötter, 2007) due to mining activities within the provinces (see Table 3).

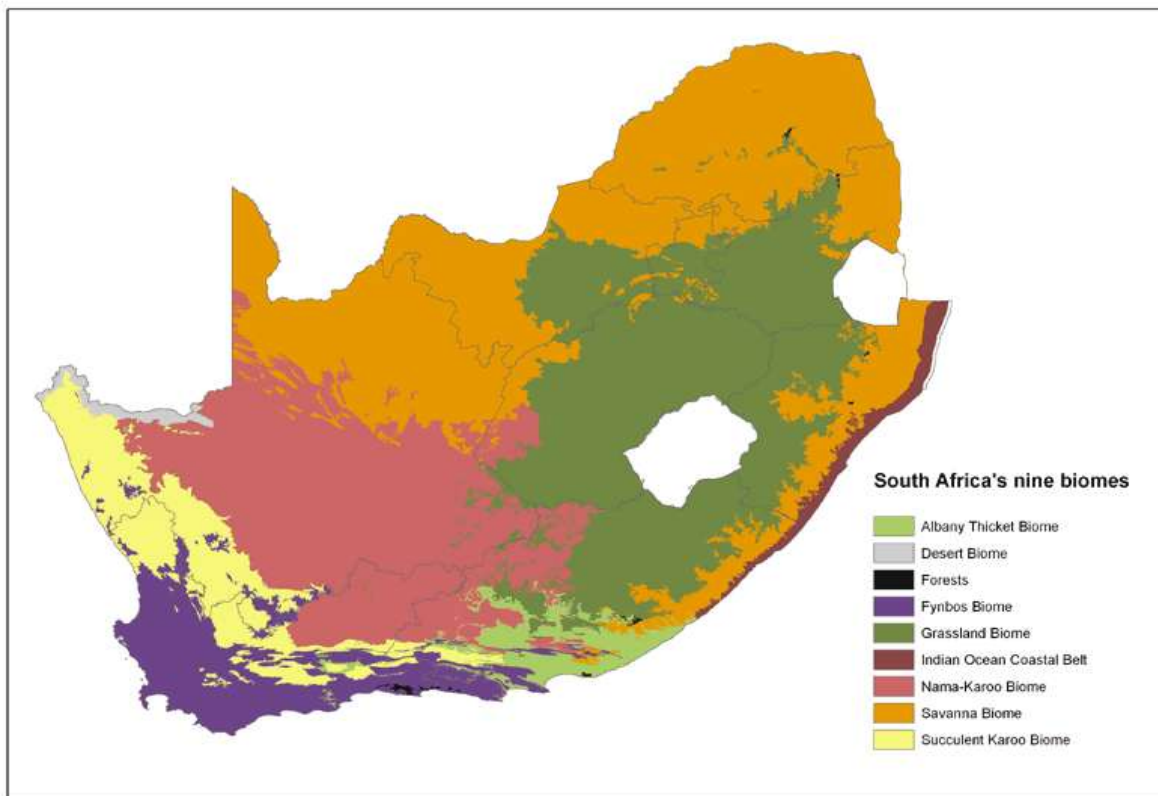


Figure 5: South African biome distribution (Mucina & Rutherford, 2006)

Table 2: South African ecological zones and their conservation status

Biomes	Distribution	Conservation Status	Land area covered (%)
Fynbos	In south and south west regions of the country.	Vulnerable – Critically endangered	Over 6
Forests	Frost free areas along the southern and eastern coasts of the country; and inland along the eastern edge of the escarpment.	Critically Endangered	1
Grasslands	In high central plateau and inland areas in the eastern part of the country.	Vulnerable – Critically endangered	26
Nama-Karoo	Namaqualand in dry rocky areas and deserts on the western half of the central plateau.	Vulnerable	23
Savanna	In northern and north-eastern parts of the country, but small patches have developed in the south-east.	Vulnerable Endangered	- 46
Succulent Karoo	Western and southern edges of the central escarpment.	Vulnerable Endangered	- 6.5
Thicket	It occurs as narrow strips along the southern, mostly the eastern coast.	Vulnerable Endangered	- Over 3%
Wetlands	In areas with water table that stands near the land surface seasonally or permanently and supports hydrophytes. They are the ecotones between dry land and water bodies.	Vulnerable – Critically endangered	

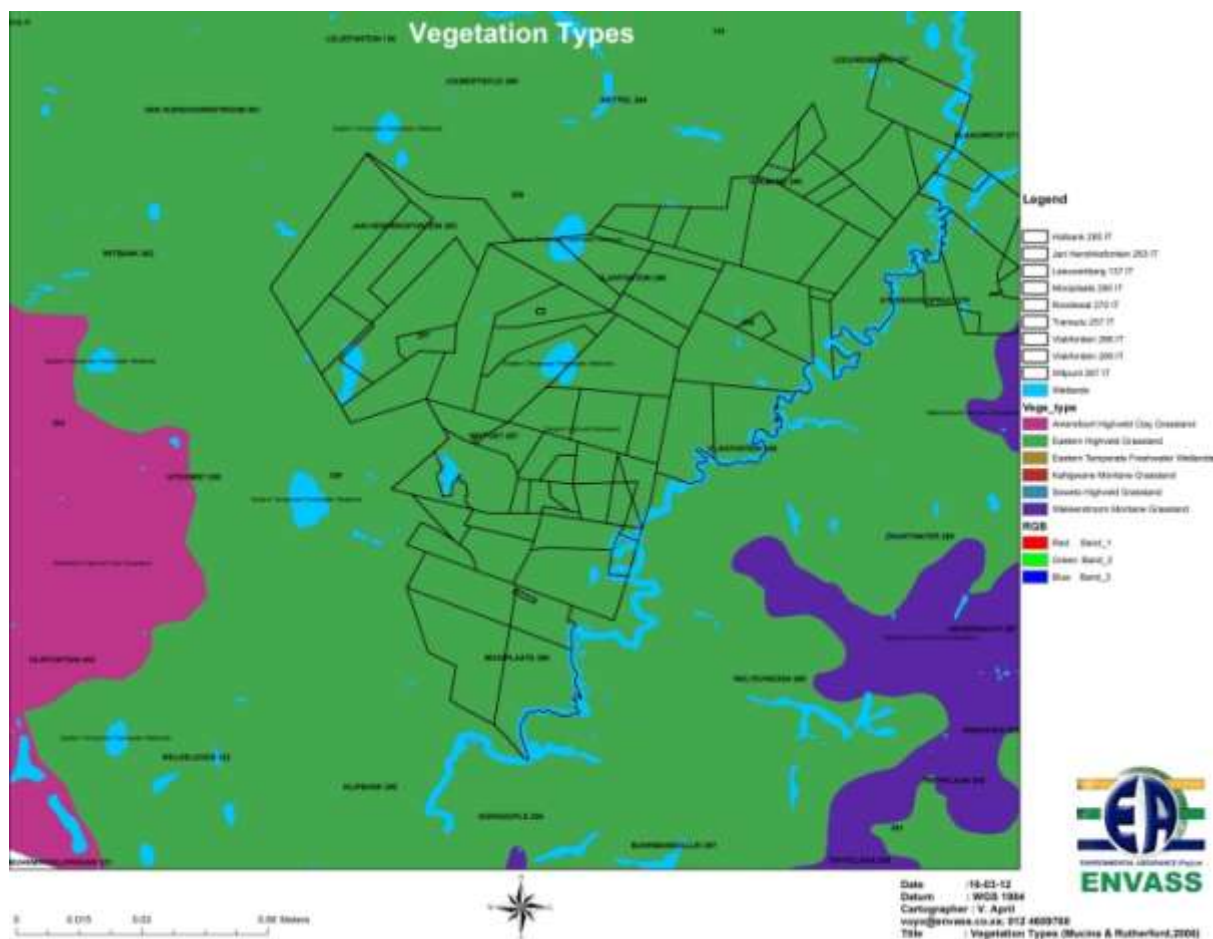


Figure 6: Vegetation types that falls within the study area

Table 3: The twelve vegetation types under most pressure from mining potential ranked from highest to lowest and the mining pressure from high to medium (Rouget et.al., 2004).

Vegetation Type	% High	% Medium
Namib Seashore Vegetation	100	0
Subtropical Seashore Vegetation	96	0
Richtersveld Coastal Duneveld	87	0
Subtropical Dune Thicket	87	0
Northern Escarpment Dolomite Grassland	67	0
Namaqualand Seashore Vegetation	58	0
Wakkerstroom Montane Grassland	0.5	89
Nwambyia-Pumbe Sandy Bushveld	0	83
Eastern Highveld Grassland	0.2	72
Springbokvlakte Thornveld	0.3	66
Soweto Highveld Grassland	46	61
Delagoa Lowveld	0	53

The land use practices of the Mpumalanga province had inflicted an enormous change in the terrestrial ecosystem. Current regional, provincial and national environmental conservation agency such as NSBA and MPBCP has considered the area very important and of biodiversity significance thus requires protection (Driver et al, 2004; Ferrar & Lötter, 2006). The portion of remaining natural habitat in the province requires maintenance and an optimum management plan to avoid further loss. The terrestrial ecosystem where the USUTU Colliery is situated is severely affected by the developments and unfortunately none of the land around it is formally protected making the area prone to exploitations (Figure 7 and Figure 8).

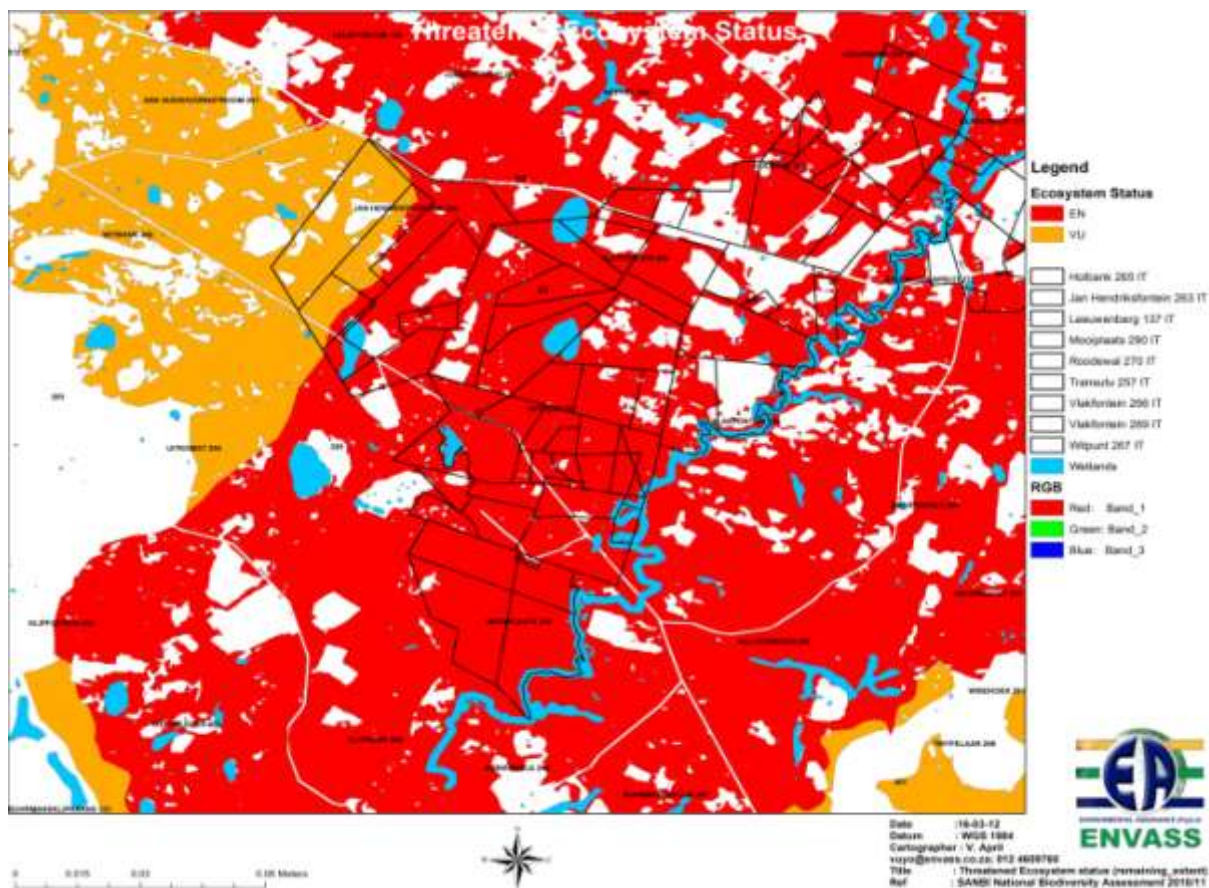


Figure 7: National Spatial Biodiversity Assessment considers the remaining natural ecosystem status where USUTU Colliery is situated endangered -Vulnerable (NSBA, 2004)

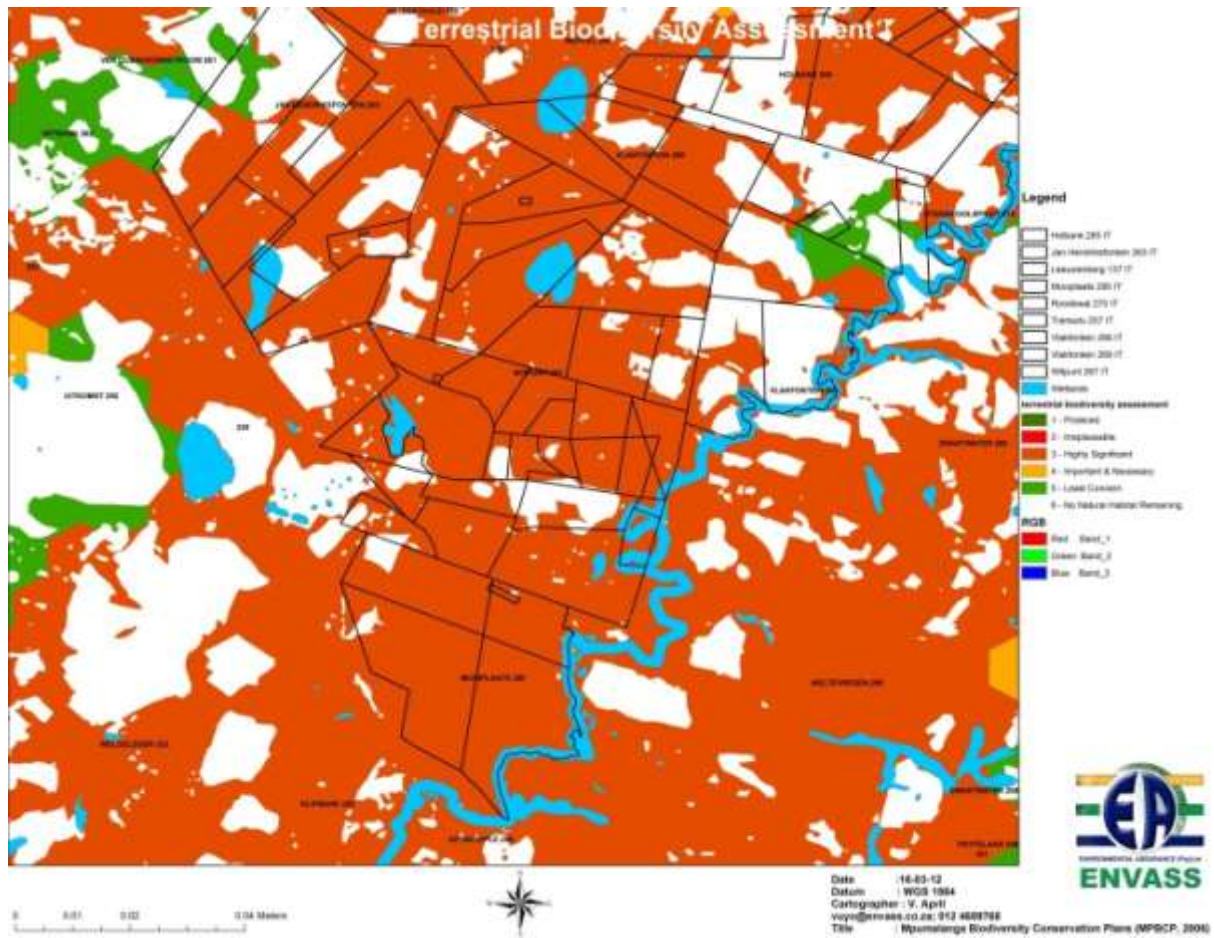


Figure 8: The Mpumalanga Terrestrial Ecosystem Biodiversity Conservation Plans which designate the remaining natural vegetation types of the study site as highly significant (MPBCP, 2006)

Findings show that:-

13.1.1. Land use description of each study site

The underground mining portions Holbank 256IT portion 0,3,5,7,8,16,18,19,20 and 21; Vlakfontein 266IT portion 4, 5, 6, 7,8, 13 and 14; Vlakfontein 265IT portion 0, 1, 2 and 3; Leeuwenburg 137IT portion 4 and Roodewal 270IT portion 4, 12 and 17 were mainly used for agricultural purposes such as commercial farming and livestock grazing. Whereas, portion 4 of Vlakfontein 269IT is a power sub-station.

Furthermore, Mooiplaats 290IT portion 1, 2, 6, 7 and 8 land use is a combination of farming and coal mining operated by Coal of Africa (Pty) Ltd. Transutu 257IT is where the Colliery infrastructure is situated. Witpunt 267IT is a combination of mining, game farming, grazing land and a lodge. The proposed activity is intended to happen at Jan Hendriksfontein 263IT where a portion of portion 3 and 4, a portion of portion 9 and portions of portion 6 and 14 will be mined using an opencast mining method. The rest of the portions of Jan Hendriksfontein are mined out and being rehabilitated; whereas a large part of the farm serves as grazing land, and is used for cultivation and a residential area (Figure 10).

13.1.2. Ecosystem functioning for each area of study

The ecology of the study area show a diverse and important ecosystem functioning. Firstly, there are National Freshwater Ecological Priority Areas (NFEPA) recognised wetlands randomly distributed through the sites and rivers running within and across the mining boundaries. The occurrence of these two ecosystems within the proposed mining sites automatically highlights the sensitivity of the area. A diverse array of biodiversity such as plants and fauna depend and interact within these ecosystems.

The ecological assessment covered the whole Usutu mining area but focussed especially on the farm portions (i.e. Jan Hendriksfontein) where opencast mining method is proposed (Figure 9). The assessed areas constituted open grassland with a variety of active and depressed hydrological zones that are scattered around the sites. Vegetation cover within open areas (i.e. areas that have minimal human modification) was identified using Braun-Blanquet vegetation cover scale to be a class 5 as the ground was completely covered.

Two (2) types of floral species were observed, namely

- **Cryptophytes** and
- **Gramnioids**

The Cryptophytes observed were a variety of geophytes, helopytes and hydrophytes which grew along the floodplains (i.e. Ramsar recognised type of a wetland), whereas the gramnioids mainly of Poaceae family covered the remaining portions of the area. The detailed list of the observed flora in the study site is tabulated in Table 5

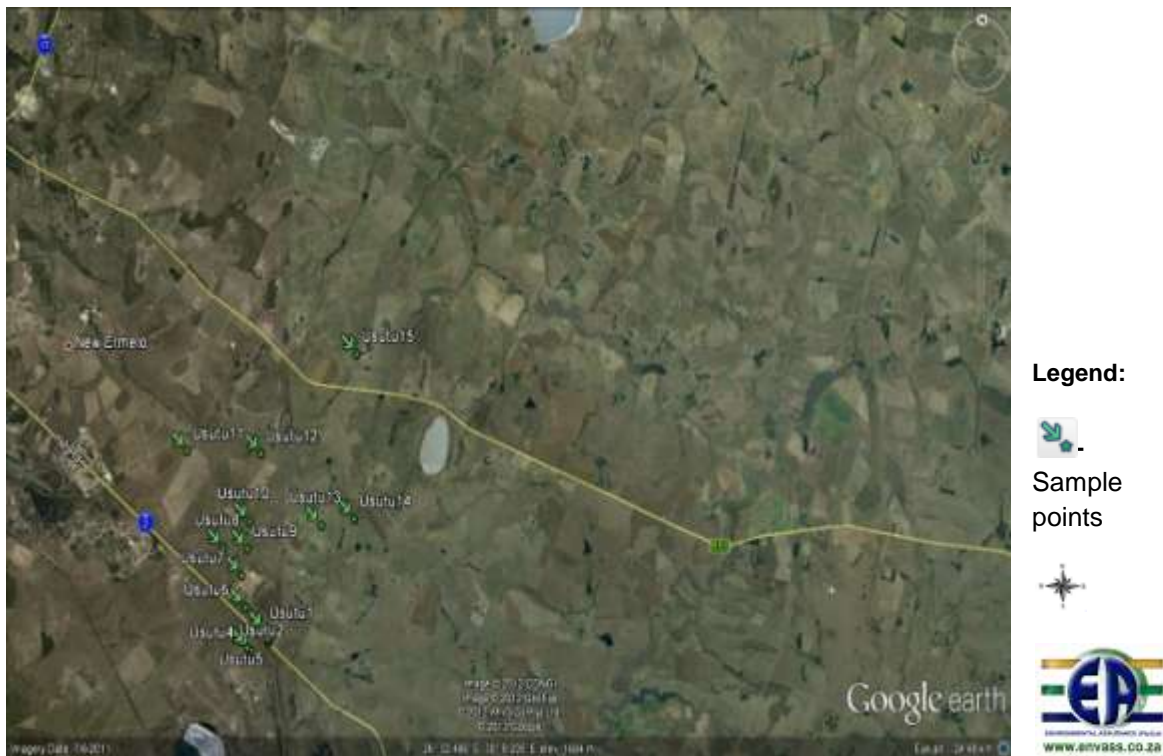


Figure 9: Transects and visual observation sampling points

13.2 Flora communities

Floral communities presented within the study site were differentiated into 3 groups of the above mentioned floral types, namely:

- Flora species of special conservation concern
- Pioneer plants species
- Invasive and noxious plant species

The flora species of special conservation concern (SCC) were identified as plant species that play an optimum role in the ecosystem functionality. These plants were found to occur around the wetland areas within the study sites (Table 4) (NSS, 2011, Lubbe, 2011). Their existence is necessary for the continuous functionality of the wetland.

Table 4: List of flora species of special concern that has a potential to occur at the study site and their Red List status

Family	Scientific name	Red list status	Occurrence
Cyperaceae	<i>Pycreus macranthus</i>	Least concern	Highly likely
Poaceae	<i>Themeda triandra</i>	Least concern	Highly likely
Poaceae	<i>Aristida junciformis</i>	Least concern	Highly likely
Typhaceae	<i>Typha capensis</i>	Least concern	Highly likely
Cyperaceae	<i>Schoenoplectus brachyceras</i>	Least concern	Highly likely
Cyperaceae	<i>Carex acutiformis</i>	Least concern	Highly likely

Cyperaceae	<i>Schoenoplectus pugnans</i>	Least concern	Highly likely
Poaceae	<i>Eragrostis plana</i>	Least concern	Highly likely
Poaceae	<i>E.curvula</i>	Least concern	Highly likely
Poaceae	<i>Stipagrostis uniplumis</i>	Least concern	Highly likely
Hyacinthaceae	<i>Eucomis autumnalis</i>	Vulnerable	Highly likely
Amaryllidaceae	<i>Nerine gracilis</i>	Endangered	Likely
Cyperaceae	<i>Fuirena pubescens</i>	Least concern	Highly likely
Poaceae	<i>Arundinella nepalensis</i>	Least concern	Highly likely
Poaceae	<i>Gladiolus crassifolius</i>	Least concern	Highly likely
Poaceae	<i>Aristida congesta</i>	Least concern	Highly likely
Poaceae	<i>Egrostis lachnantha</i>	Least concern	Highly likely
Poaceae	<i>Andropogon eucomus</i>	Least concern	Highly likely
Poaceae	<i>Sporobolus africanus</i>	Least concern	Highly likely
Poaceae	<i>Imperata cylindrical</i>	Least concern	Highly likely
Orchidaceae	<i>Bletilla ochracea</i>	Least concern	Highly likely
Anacardiaceae	<i>Searsia dentata</i>	Least concern	Highly likely
Asteraceae	<i>Gazania krebsiana</i>	Least concern	Highly likely
Amaryllidaceae	<i>Brunsvigia randulosa</i>	Least concern	Highly likely
Rubiaceae	<i>Richardia brasiliensis</i>	Least concern	Highly likely
Lobeliaceae	<i>Lobelia flaccid</i>	Least concern	Highly likely
Cyperaceae	<i>Carex cognata</i>	Least concern	Highly likely
Gunneraceae	<i>Gunnera perpensa</i>	Declining	Highly likely
Poaceae	<i>Andropogon appendiculatus</i>	Least concern	Highly likely
Poaceae	<i>Miscanthus capensis</i>	Least concern	Highly likely
Cyperaceae	<i>Fimbristylis complanata</i>	Least concern	Highly likely
Cyperaceae	<i>Kyllinga erecta</i>	Least concern	Highly likely
Amaryllidaceae	<i>Hermanthus hirsutus</i>	Declining	Highly likely
Amaryllidaceae	<i>Crinum bulbispermum</i>	Least concern	Highly likely
Anemiaceae	<i>Mohria nudiuscula</i>	Least concern	Highly likely
Aquifoliaceae	<i>Ilex mitis</i>	Declining	Highly likely
Colchicaceae	<i>Colchicum striatum</i>	Least concern	Highly likely
Brassicaceae	<i>Cardamine Africana</i>	Least concern	Highly likely
Asphodelaceae	<i>Kniphofia typhoides</i>	Rare	Likely
Campanulaceae	<i>Wahlenbergia undulata</i>	Least concern	Highly likely
Iridaceae	<i>Gladiolus malvinus</i>	Vulnerable	Highly likely
Oleaceae	<i>Jasminum streptopus</i>	Least concern	Highly likely
Myrsinaceae	<i>Myrsine africana</i>	Least concern	Highly likely
Asphodelaceae	<i>Aloe kniphofioides</i>	Vulnerable	Highly likely
Geraniaceae	<i>Geranium wakkerstroomianum</i>	Least concern	Highly likely
Lythraceae	<i>Nesaea sagittifolia</i>	Least concern	Highly likely

Poaceae	<i>Setaria nigrirostris</i>	Least concern	Highly likely
Poaceae	<i>Urochloa panicoides</i>	Least concern	Highly likely

Pioneer plant species observed in the area were represented by *Cosmos bipinnatus*, *Verbana bonariensis* and *Leersia hexandra*, *Hyparrhenia hirta* which are plants that uses any opportunity to invade a disturbed or transformed for such a short period of time. Some pioneer plants like *Cosmos* are environmentally acceptable and regarded as important as their flowers offers a breath taking and a welcome change to the landscape by beautifying the area.

The invasive and noxious weeds observed in the area were *Circium vulgare*, *Conyza bonariensis*, *Pennisetum clandestinum*, *Salix babylonica*, *Datura stramonium*, *Tribulus terrestris*, *Phragmites australis*, *Arundo donax*, Oak, *Eucalyptus sp*, Pine trees and few Weeping willow tree species stand. These plants are often used as indicators of disturbed areas. They use such opportunity to invade, infest and encroach in the area gradually displacing endemic species. They become problematic to the invaded or introduce area because they outcompete and displace indigenous plant species, and they use large amount of ground and surface water drying the rivers, dams or any water source close to their range.

The list of all the flora communities observed within the study site is tabulated under Table 5 below.

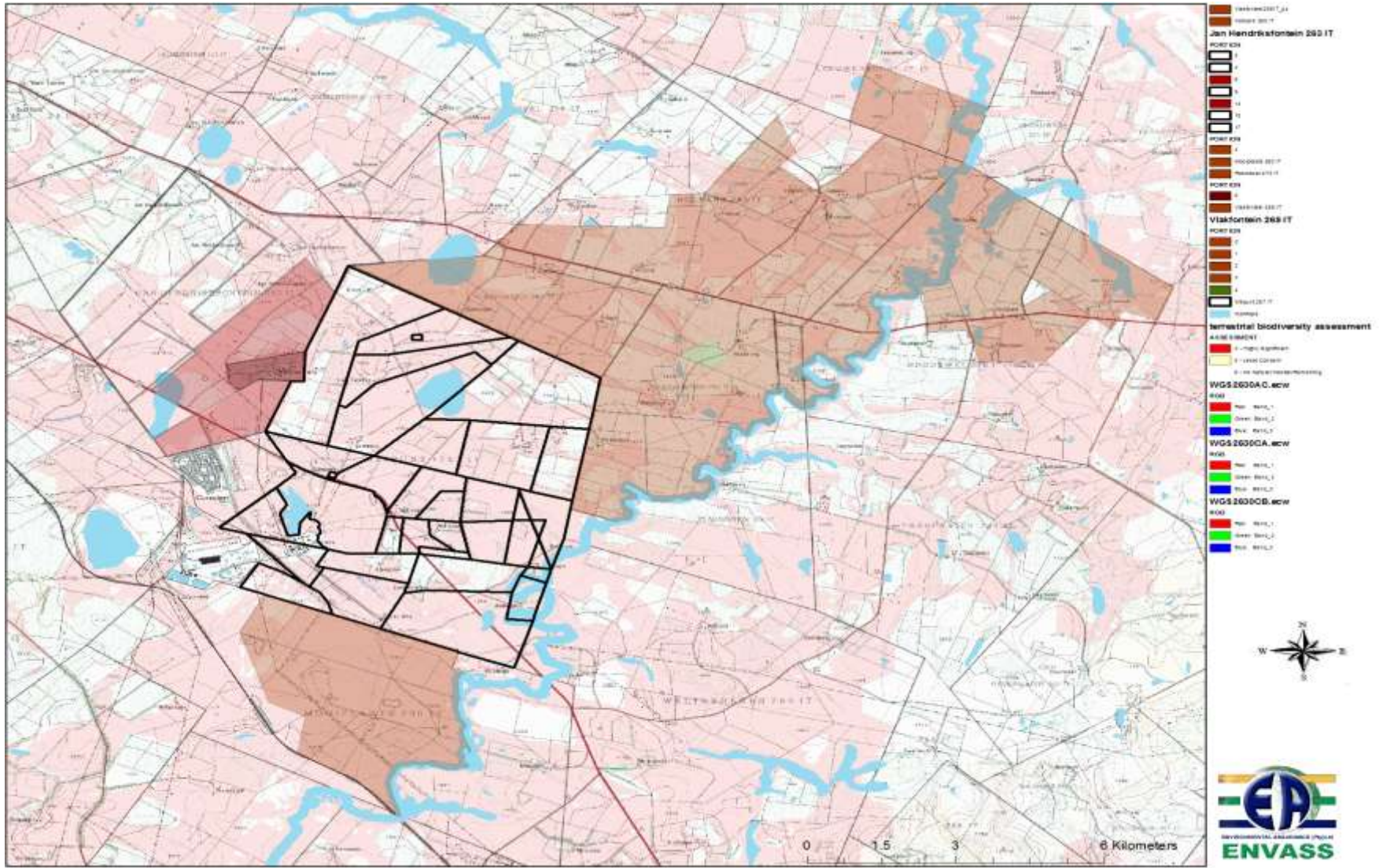


Figure 10: Usutu whole mining extent

Table 5:- List of flora observed in the study area

Family	Scientific name	Common Name	Conservation status	Growth form	Endemism
Myrtaceae	<i>Eucalyptus sp.</i>	Gum tree	Alien Invasive	Tree	Introduced
Pinaceae	<i>Pinus sp.</i>	Pine tree	Alien invasive	Tree	Introduced
Salicaceae	<i>Salix sp.</i>	Wiping willow	Alien invasive	Tree	Introduced
Fagaceae	<i>Quercus sp.</i>	Oak tree	Alien invasive	Tree	Introduced
Poaceae	<i>Aristida justiformis</i>	Three awn grass	Least concern	gramniods	annual
Anacardiaceae	<i>Searsia dentate</i>	Nana-berry	Least concern	shrub	perennial
Poaceae	<i>Eragrostis plana</i>	love grass	Least concern	gramniods	perennial
Poaceae	<i>Eragrotis curvula</i>	Love grass	Least concern	gramniods	perennial
Poaceae	<i>Stipagrostis uniplumis</i>	beesgras	Least concern	gramniods	perennial
Poaceae	<i>Gladiolus crassifolium</i>	Wild gladiolus	Least concern	gramniods	perennial
Orchidaceae	<i>Bletilla ochracea</i>	Chinese butterfly	Least concern	herb	annual
Poaceae	<i>Imperata cylidrica</i>	Congon grass	Least concern	gramniods	annual
Poaceae	<i>Sporobolus africanus</i>	Ratstail/ dropseed	Least concern	gramniods	perennial
Poaceae	<i>Eragrostis lachnantha</i>	Bent grass	Least concern	gramniods	perennial
Asteraceae	<i>Gazania krebsiana</i>	daisy	Least concern	herb	perennial

Amaryllidaceae	<i>Brunsvigia randulosa</i>	Candelabra flower	Least concern	herb	perennial
Rubiaceae	<i>Richardia brasiliensis</i>	Mexican clover	Least concern	herb	
Lobeliaceae	<i>Lobelia flaccid</i>	Wild lobelia	Least concern	herb	
Amaryllidaceae	<i>Hermanthus hirsutus</i>	hirsutus	Declining	herb	endemic
Asteraceae	<i>Cosmos bipinnatus</i>	cosmos	Least concern	herb	pioneer
Cyperaceae	<i>Kyllinga erecta</i>	kyllinga	Least concern	herb	perennial
Poaceae	<i>Paspalum dilatatum</i>	Paspalum grass	Least concern	gramniods	perennial
Poaceae	<i>Themeda triandra</i>	Rooi grass	Least concern	gramniods	perennial
Poaceae	<i>Aristida junciformis</i>	Ngongoni grass	Least concern	gramniods	annual
Poaceae	<i>Aristida congesta</i>	Tassel three awn	Least concern	gramniods	annual
Poaceae	<i>Andropogon eucomus</i>	Snowflake grass	Least concern	gramniods	Annual
Convolvulaceae	<i>Convolvulus arvensis</i>	akkerwinde	exotic	herb	perennial
Zygophyllaceae	<i>Tribulus terrestris</i>	Devil's thorn	exotic	herb	perennial
Verbanaceae	<i>Verbena bonariensi</i>	verbana	exotic	herb	pioneer
Poaceae	<i>Leersia hexandro</i>	Rice grass	Invasive alien	gramniods	introduced
Poaceae	<i>Hyperhenia hirta</i>	Thatching grass	Least concern	gramniods	annual
Cyperaceae	<i>Fimbristylis complanata</i>	sedge	Least concern	Sedge	annual

Asteraceae	<i>Cirsium vulgare</i>	Spear thistle	exotic	herb	introduced
Asteraceae	<i>Conyzo bonariensis</i>	horseweed	exotic	herb	introduced
Poaceae	<i>Pennisetum clandestinum</i>	Kikuyi grass	exotic	gramniods	introduced
Solanaceae	<i>Datura starromium</i>	stinkweed	noxious	herb	pioneer
Poaceae	<i>Miscanthus capensis</i>	Silver grass	Least concern	gramniods	annual
Zygophyllaceae	<i>Tribulus terrestris</i>	Devil's thorn	noxious	herb	pioneer
Poaceae	<i>Arundo donax</i>	reed	noxious	gramnoid	perennial
Poaceae	<i>Andropogon appendiculatus</i>	Vlei bluestem	Least concern	gramnoids	annual
Hyacinth	<i>Drimia altissima</i>	Jeukbol	Least concern	herb	perennial
Hypoxidaceae	<i>Hypoxis hermerocallidae</i>	stargras	Least concern	herb	perennial
Gunneraceae	<i>Gunnera perpensa</i>	Wild rhubarb	Declining	herb	perennial
Amaryllidaceae	<i>Crinum bulbispermum</i>	lily	Least concern	herb	perennial
Cyperaceae	<i>Carex cognate</i>	sedge	Least concern	sedge	annual
Nymphaeae	<i>Nymphaeae nouchali</i>	Water lily	Least concern	herb	perennial
Cyperaceae	<i>Pycreus macranthus</i>	sedge	Least concern	sedge	annual
Geraniaceae	<i>Geranium wakkerstroomianum</i>	geranium	Least concern	herb	perennial
Poaceae	<i>Arundinella nepalensis</i>	reedgrass	Least concern	gramnoids	annual

Convolvulaceae	<i>Ipomoea obscura</i>	Morning glory	Least concern	herb	perennial
Cyperaceae	<i>Fuirena pubescens</i>	sedge	Least concern	sedge	annual
Asteraceae	<i>Helichrysum splendidum</i>	Yellow daisy	Least concern	herb	perennial
Cyperaceae	<i>Carex acutiformis</i>	Pond sedge	Least concern	sedge	perennial
Asteraceae	<i>Helichrysum pallidum</i>	Silver hottentot tea	Least concern	herb	perennial
Asteraceae	<i>Haplocarpha scaposa</i>	False gerbera	Least concern	herb	perennial
Poaceae	<i>Phragmites australis</i>	Common reed	Introduced/invasive	gramnoids	annual
Asteraceae	<i>Gerbera piloselloides</i>	gerbera	Least concern	herb	perennial
Typhaceae	<i>Typha capensis</i>	Cape bulrush	Least concern	sedge	annual
Iridaceae	<i>Gladiolus crassifolius</i>	gladioli	Least concern	herb	perennial
Cyperaceae	<i>Schoenoplectus brachyceras</i>	sedge	Least concern	sedge	perennial
Cyperaceae	<i>Schoenoplectus sp.</i>	sedge	Least concern	sedge	perennial
Orchidaceae	<i>Eulophia clavicomis</i>	orchid	Least concern	herb	perennial
Amaryllidaceae	<i>Crinum bulbispermum</i>	River lily	Least concern	herb	perennial
Anemiaceae	<i>Mohria nudiuscula</i>	-	Least concern	herb	perennial
Aquifoliaceae	<i>Ilex mitis</i>	Waterboom/African holly	Declining	shrub	perennial

Colchicaceae	<i>Colchicum striatum</i>	-	Least concern	herb	perennial
Brassicaceae	<i>Cardamine Africana</i>	-	Least concern	herb	perennial
Campanulaceae	<i>Wahlenbergia undulate</i>	-	Least concern	Herb	perennial
Iridaceae	<i>Gladiolus malvinus</i>	-	Vulnerable	herb	perennial
Oleaceae	<i>Jasminum streptopus</i>	-	Least concern	shrub	perennial
Myrsinaceae	<i>Myrsine Africana</i>	-	Least concern	shrub	perennial
Asphodelaceae	<i>Aloe kniphofioides</i>	-	Vulnerable	herb	perennial
Lythraceae	<i>Nesaea sagittifolia</i>	-	Least concern	shrub	perennial
Poaceae	<i>Setaria nigrirostis</i>	-	Least concern	grass	perennial
Poaceae	<i>Urochloa panicoides</i>	-	Least concern	perennial	annual

13.3 Faunal Communities

The USUTU Colliery area and the surrounding areas are recognised as Upper Management Areas by South African National Biodiversity Institute due to the numerous wetlands found there. These wetlands are known to be the crucial source of life to animals that use Moist grassland areas for habitat, breeding and as a migratory den. Due to the extensive mining and agricultural land use happening in that area, some of the wetlands have been affected and tampered with to a point of disfunctionality (

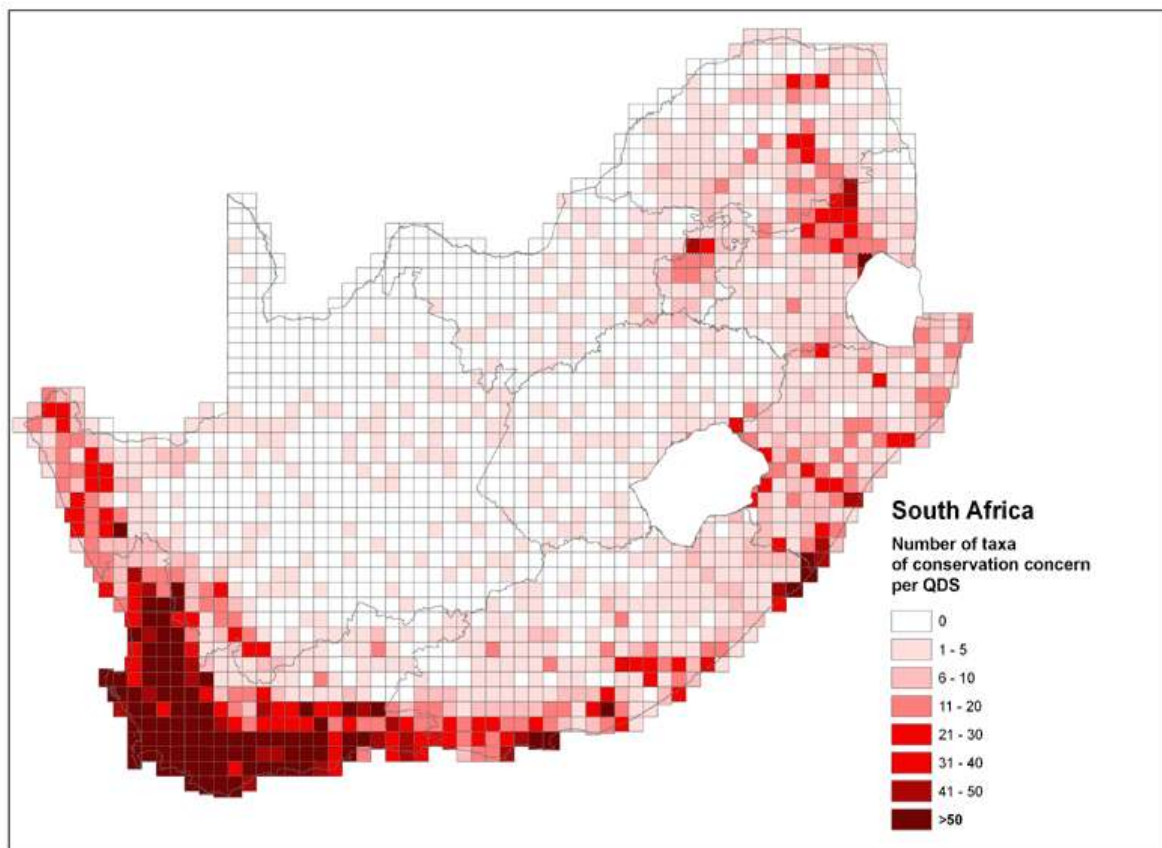


Figure 11). However, the remaining natural and some of the transformed wetlands does still offer ecosystem functions mainly to avi-fauna observed in the study site.

There was little to nothing observed with regards to the game or small mammals within the area, only livestock feeding in adjacent farms were observed. In one instance a Duiker spoor was observed in Jan Hendriksfontein area. It should be noted that there were old and new burrows of varying sizes indicating the presence of ground dwelling animals at the above mentioned farm area.

The avi-fauna observed in the study area were grouped into two categories:

- Birds of special conservation status
- Common birds

The birds of special conservation status observed in the study area were *Tyto capensis*, *Geronticus calvus*, *Sagittarius serpentarius*, *Falco biarmicus* and *Falco amurensis*.

Common birds observed were made up of birds that were observed during site visits and sampling together with the birds that are used as indicators of disturbance. The observed birds during the study were, *Streptolia semitorquata*, *Vidua macroura*, *Bubulcus ibis*, *Apus caffer*, *Cisticola juncidis*, *Corvus albus*, *Myrmecocichla formicivora*, *Plegadis falcinellus*, *Fulica cristata*, *Anas undulate*, *Pternistis wainsonii*, *Amaurornis flavirostris*, *Acrocephalus beaticatus*, *Phalacrocrax lucidus*, *Charadrius tricollaris*, *Riparia paludicola*, *Bostrychia hagedash*, *Ploceus velatus*, *Euplectes orix*, *Hirundo rustica*, *Passer domesticus*, *Motacilla capensis* and *Vanellus coronatus*.

However, birds such as Blue Crane have been reported on and around the area together with the occurrence of reptiles such as rinkhals and molesnakes *Pseudaspis cana*, neither of these were observed or encountered during the study.

The site carrying capacity for wild game was observed to be low due to the fact that the study area is significantly disturbed. The informal settlement encroachment nearby, the mixed agricultural farming and the road construction all add more disturbance pressure to the area on top of the operational mining activities.

Therefore, it is certain that the game unlike avian fauna would either move away from the area of disturbance or decline to the point of non-existence in the area. The only wildlife observed were springbuck at one of the nearby lodges, but there was an animal spore observed on the Jan Hendriksfontein site and it has been identified as a Duiker *Sylvicapra gramma* spoor.

The insects observed on the site included the Lepidopterans, the Coleopterans, Isopterans, Hymenopterans and Orthoptera. The Lepidopterans were the dominating group among these insects with *Danus Chrysippus* sp. *orientis* being the most common butterfly seen fluttering around the area. It was followed by *Belenois aurota*, *Danaus chrysippus*, *Eurema brigitta* and *Chilandes trochylus* also observed at the site.

The list of all the faunal species observed and recorded around the USUTU Colliery and surrounding areas are tabulated in Table 6.

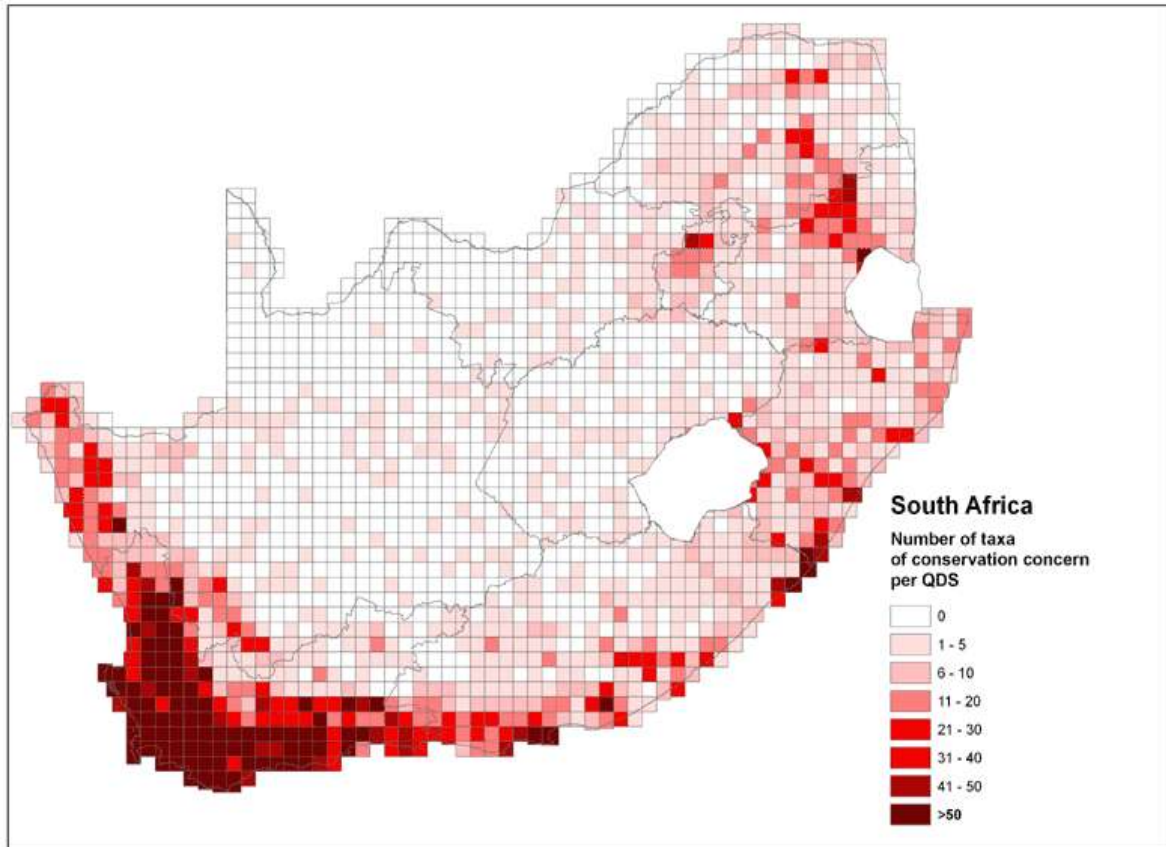


Figure 11: South African taxa of conservation concern (source SANBI, 2011)

Table 6:- List of fauna observed in the study area, their conservation status is based on the Red list categories of 2011

Order	Family	Scientific name	Common name	Conservation status
Lepidoptera	Nymphalidae	<i>Danaus chrysippus</i> subsp. <i>orientis</i>	African monarch butterfly	Least concern
Strigiformes	Tytonidae	<i>Tyto capensis</i>	African grass owl	vulnerable
Lepidoptera	Pieridae	<i>Belenois aurota</i> subsp. <i>aurota</i>	Vein white butterfly	Least concern
Ciconiiformes	Threskionithinae	<i>Geronticus colvus</i>	Bald ibis	vulnerable
Lepidoptera	Pieridae	<i>Eronia leda</i>	Autumn leaf vagrant	Least Concern
Accipitriformes	Sagittariidae	<i>Sagittarus serpentaris</i>	Secretary bird	vulnerable
Lepidoptera	Lycaenidae	<i>Chilades trochylus</i>	Grass jewel	Least concern
Lepidoptera	Pieridae	<i>Eurema brigitta</i>	Grass yellow	Least Concern
Falconiformes	Falconidae	<i>Falco biarmicus</i>	falcon	Near threatened
Orthoptera	Acrididae	<i>Orthochotha dasyncnemis</i>	grasshopper	Not Assessed
Odonata	Libellulidae	<i>Sp.1</i>	Dragon flies	Not assessed
Odonata	Coenagrionidae	<i>Sp.1</i>	Damselflies	Not assessed
Coleoptera	Tenebrionidae	<i>Psammodes sp.</i>	Tok-tokkies	Not Assessed
Falconiformes	Falconidae	<i>Falco amurensis</i>	Amur falcon	Least concern
Diptera	Muscidae	<i>Musca domestica</i>	House flies	Not Assessed
Diptera	Calliphoridae	<i>Chrysomya sp.</i>	Blow flies	Not Assessed
Hymenoptera	Vespidae	<i>Vespula sp.</i>	Social wasps	Not Assessed
Isoptera	Termitae	<i>Termite sp.</i>	Social termites	Not Assessed
Hymenoptera	Apidae	<i>Apis mellifera</i>	Social Bees	Not Assessed
Hymenoptera	Formicidae	<i>Anoplolepis custodiens</i>	ants	Not Assessed
Columbiformes	Columbidae	<i>Streptolia semitorquata</i>	Red eye dove	Least concern

Passeriformes	Cisticolidae	<i>Cisticola jucindis</i>	cisticola	Least concern
Rodentia	Pedetidae	<i>Petedes capensis</i>	Spring hare	Least concern
Pelecaniformes	Threskiornithae	<i>Plegadis falcinellus</i>	Black glossy ibis	Least concern
Gruiformes	Rallidae	<i>Fulica cristata</i>	Red knobbed coot	Breeding site
Galliformes	Numididae	<i>Numida melaegris</i>	Guinea fowls	Least concern
Charadriiformes	Charadriidae	<i>Vanellus coronatus</i>	Crowned plover	Least concern
Apodiformes	Apodidae	<i>Apus caffer</i>	Swifts	Least concern
Passeriformes	Lybiidae	<i>Tricholoema leucomelas</i>	Barbet	Least concern
Passeriformes	Alaudidae	<i>Calenduluada sabota</i>	Lark	Not Assessed
Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Swallows	Least concern
Passeriformes	Muscicapidae	<i>Myrmecocichla formicivora</i>	Ant eating chant	Least concern
Passeriformes	Ploceidae	<i>Ploceus velatus</i>	Weaver	Least concern
Passeriformes	Viduidae	<i>Vidua mucroura</i>	Whydah	Least concern
Anseriformes	Anatidae	<i>Anas undulate</i>	Yellow billed duck	Breeding site
Galliformes	Phasianidae	<i>Pternistis swainsonii</i>	spurfowl	Breeding site
Pelecaniformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	Least concern
Gruiformes	Rallidae	<i>Amauromis flavirostris</i>	crake	Least concern
Passeriformes	Acrocephalidae	<i>Acrocephalus beaticatus</i>	Reed wabbler	Least cocern
Suliformes	Phalacrocoracidae	<i>Phalacroxas lucindus</i>	Reed cormorant	Least concern
Charadriiformes	Charadriidae	<i>Charadrius tricollaris</i>	Banded plover	Least concern
Passeriformes	Hirundinidae	<i>Ruparia paludicola</i>	Brown throated martin	Least concern
Columbiformes	Columbidae	<i>Streptolia capicola</i>	dove	Least concern
Pelecaniformes	Threskiornithae	<i>Bostrychia hagedash</i>	Hadedda ibis	Least concern
Passeriformes	Ploceidea	<i>Ploceus velatus</i>	Masked weaver	Least concern
Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Barn swallow	Least concern
Passeriformes	Passeridae	<i>Passer domesticus</i>	sparrow	Least concern

Passiformers	Motacillidae	<i>Motacilla capensis</i>	wangtail	Least concern
Passeriformes	Corvidae	<i>Corvus albus</i>	Black crow	Least concern
Pelecaniformes	Ardeidae	<i>Ardea melanocephala</i>	Black heron	Least concern
Passeriformes	Ploceidae	<i>Euplectes orix</i>	Red bishop	Least concern
Artiodactyla	Bovidae	<i>Bos primigenius</i>	Cattle/cow	Domesticated
Passeriformes	Ploceidae	<i>Euplectes afer</i>	Yellow crown bishop	Least concern

14. Species of special concern

14.1 Flora

The findings of this ecological study highlighted the fact that the study sites are areas of conservation importance. Their ecology shows a diverse ecosystem functionality and biodiversity variation. The ecosystems such as wetlands (floodplains, seeps, pans and rivers) observed within the study sites are extensively used as habitats. Such habitats are important for species as the areas of establishment and persistence.

Plants and grasses observed during the study plays a major role as they offer soil coverage (i.e. ground cover) thus prevent erosion. Plants are the most conspicuous component of wetland ecosystems and play a pivotal role; they function as one of the primary producers by bringing energy to the system. They provide oxygen, critical habitat for fauna and influence water chemistry. Plant roots are used to stabilize the soil and absorb toxic material thus purifying water systems. The occurrence of plants helps reduce the flow of rivers and filters the runoffs therefore minimizing the possibility of sedimentation.

14.2 Fauna

The fauna species in particular the avi-fauna were mostly observed utilizing the wetland area and their presence on the sites is mainly associated with the wetlands. These wetlands and plants are used as habitats, breeding and nesting. Furthermore, the plants are also used as food source and as shelters, thus the areas which are still intact and functioning should be maintained and managed to avoid further habitat loss or disturbance.

The establishment of the opencast mine will signify that the vegetation together with a variety of flora be removed. Therefore, species would lose their habitat and the ecosystem functioning will be disturbed or interrupted. This will cause immense environmental impacts to the area, the floodplains that offers ecological variation to the site and serve as flora and fauna species habitat will be affected by this method of mining. These ecosystems provide flood protection and control erosion; they purify our water supply, and are a major source of recreation and aesthetic appreciation. To protect wetlands it is imperative to ensure the survival of plant genes, species, and natural communities in these ecosystems.

Underground mining in comparison with the opencast mining is not highly destructive but has its own share of environmental impacts. The underground mining plays a minor role in vegetation loss and faunal disturbance, but it is known to cause severe effects on groundwater, surface water and soil stability, which in turn can affect flora and fauna in the area.

During the study, it was observed that most of the wetlands in the area were dry or depressed and altered to support the type of land use they fall in. On the farms Vlankfontein 266IT, Vlankfontein 269 IT, Holbank 265IT and Roodewal 270IT the waterlogged areas and floodplains were altered to suit the agricultural activities practiced there. Around the above mentioned farms, dams were constructed and wetlands altered for different agricultural uses such as irrigation, drinking holes and alteration for cultivation purposes. One area had a manmade dam, where hydrophytes, an indicator of a wetland, have established and certain fauna species like the African Grass Owl had adapted to use this area as a habitat. These activities together with mining, road construction and using the area for livestock pasture had severely impacted on wetlands and their functioning. Therefore, the wetlands within that area are degraded (see Coetzee, 2012) and species functionality decreased as a result.

Bird species like Wattled crane and Blue crane which are wetland species have left the area due to the disturbance in their habitat and these bird species have been listed as threaten species due to the threat their habitat is experiencing.

The species of concern observed and recorded in the area show how important it is to conserve and manage the remaining flora and fauna in the area to continue receiving optimum ecosystem functioning within the area. Mpumalanga Province has already been referred to by SANBI as one of the provinces in South Africa with an endangered and vulnerable ecosystem. Further monitoring and assessments are needed to determine the existence of other species of ecological importance within the area.

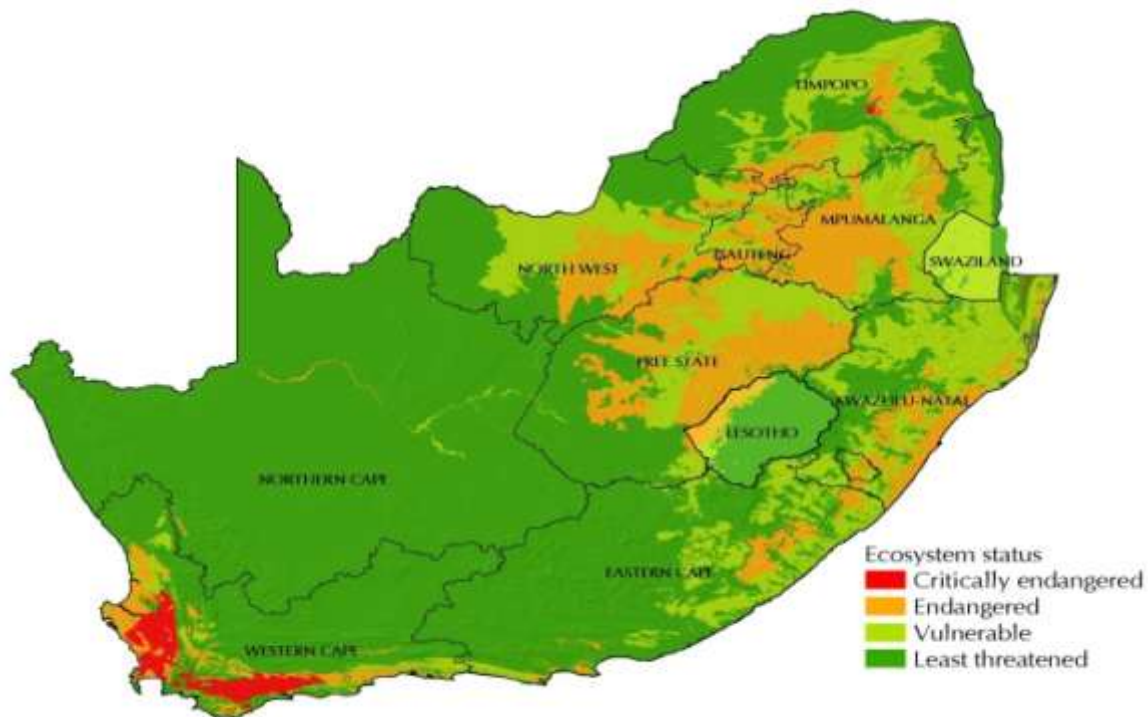


Figure 12: South African Ecosystem status (source: SANBI, 2011)

14.2 Aliens and Invasives

Aliens and invasive plants are opportunistic plants that invade areas that are disturbed, thus competing and replacing endemic plants. They have a potential to degrade the area and make it more susceptible to fire as their fuel content is high and uses more water than the indigenous plant species. Land uses that often disturbed the environment such as mining, agriculture and mismanagement of the environment results in the area being susceptible to alien and invasive plant invasion. In terms for CARA 43 of 1983 alien and invasive plants need to be controlled and prevented (Henderson, 2004).

The AIP's observed during the study were mainly scattered stands of red gum trees, pine trees and weeping willow trees that were found to occur on certain parts of Jan Hendriksfontein and Vlakfontein portions. These tree stands grows along the edges of the water logged and floodplain areas thus emphasizing their high use of water. Growing among these tree stands are a variety of invasive grasses and noxious weeds that took the opportunity to invade disturbed areas. Invasive grasses depending on their palability and nutrient contents can be used as fodder for livestock (Milton, 2004).

The proposed project area is already prone to disturbance and invasive and noxious plant establishment and hence rehabilitation measures should be considered as further disturbance would trigger more alien and noxious weed invasion.

15. Environmental Impacts and recommendations

There are 2875 wetlands found in Msukaligwa local municipality and all this together with vegetation communities within the municipality are severely endangered and their functionality is threatened by land use activity such as mining, agriculture, and infrastructure development such as road construction taking place. The study area has no formal land based protected areas thus make it susceptible to unmonitored and destructive land use activities. However, the area is regarded as an important biodiversity area and most of the importance is due to the scattered wetlands within the area that support flora and fauna life forms (Lubbe, 2011; Mare, 2012). It is in this regard that the area is extensively being used by fauna and flora.

The area is currently disturbed and should the proposed activity be authorised, additional environmental impact could occur, such as:

- Further disturbance to water zones or wetlands that still maintain their functionality,
- The habitat loss due to vegetation removal for the open cast mining, mainly areas around Jan Hendriksfontein (portion 6B, 6C, 9, 14 and block D portion 3 and 4 would be highly susceptible to irreversible vegetation removal.
- The tampering or obstruction of groundwater recharge and discharge which is often linked with underground mining and soil erosions.

As a result, species would lose their breeding and habitat sites which may lead to:

- Species declining to the levels of endangerment or critical endangered or even extinction.

The mining activity in the area will also cause the influx of job seeking individuals therefore:

- More natural remaining habitats might be lost due to those people using the vacant land for improper settlement.

Furthermore, the increase in the traffic due to importation and exportation of products will results to:

- Air pollution with plants gathering dust that come off the ground,
- Increase in animal or bird road kill by the moving vehicles and
- Habitat fragmentation due to new roads being constructed for access.

The soil structure will also be impacted by the underground mining and it has been reported that:

- A sedimentary strata displacement had occurred due to Diorite intrusion in the area (NSS report, 2011).

Therefore, it should be considered that with further underground disturbance there might be the probability of this displacement to re-occur and the probability of it intensifying through the area.

The proposed mining poses high environmental risks as mentioned above. However, with correct mitigation the probability will have a medium to low significance.

Should the proposed mining project be approved by authorities, the following recommendations should be used in order to minimise the environmental impacts.

USUTU colliery should:-

- Due to the status of the area they are operating on (with regards to wetlands found in the area), a water use license under section 21 (c) and (i) application should be considered,
- During their open cast mining implementation, the client should remove the vegetation gradually offering corridors for species movement to undisturbed areas by leaving strips of vegetation intact,
- It is important that the client construct its Environmental Management Plans document to include rehabilitation, maintenance of existing wetlands and invasive alien plant control in the site. The USUTU Colliery pre-rehabilitation measure should start with the harvesting and propagation of endemic flora and wetland species that would be used in the final rehabilitation before they remove the vegetation.
- Pre-cautious underground mining methods should be applied in order to avoid further displacements as experienced before. The area where displacement occurred and around that vicinity should be considered sensitive.
- Care should be taken to prevent pollution of plants by dust and road kill by putting a speed limiting notices that should be adhere to by the drivers including speed bumps to maintain the speed limit,
- Should the proposed activity be authorized, it is important for the company to put up security measures that will not allow the use of vacant land to be used for settlement purposes,
- USUTU Colliery should be responsible for maintenance of soil on the areas where the vegetation has been removed; it is in their interest to rehabilitate those areas in order to prevent further soil loss through erosion
- Any faunal species found in the vicinity should not be killed or damaged, the wandering species should be aimed to be returned to their designated area or be left around until the time it decides to move on its own.

It is important to understand that the area is a very **important conservation management area** and further disturbance to it will provoke ecosystem sensitivity, thus bi-annual monitoring of the species during and after the operational phases of the mine should be done in order to maintain and manage further ecological loss.

16. References

- Bromilow, C. 2001.** Problem Plants of South Africa : A guide to the identification and control of more than 300 invasive plants and other weeds. Briza publishers, South Africa
- Driver, A.,** Maze, K., Rouget, M., Lombard, A.T., Nel, J., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. & Strauss, T. **2005.** National Spatial Biodiversity Assessment 2004: priorities for biodiversity conservation in South Africa. *Strelitzia* 17. South African National Biodiversity Institute, Pretoria. 45pp. www.sanbi.org.
- Department of Environmental Affairs and Tourism. 2006** Guide to the Environmental Impact Assessment Regulations. DEAT. South Africa
- Department of Water Affairs and Forestry. 2005.** A practical field procedure for identification of wetlands and riparian areas. DWAF. South Africa
- Edwards, P.J.,** Abivardi, C. **1998.** The value of biodiversity: Where ecology and economy blend. *Biological Conservation* 83(3). Pp 239-246
- Henderson, L. 2004.** Alien weeds and invasive plants: A complete guide to declared weeds and invaders in South Africa. Plant Protection Research Institute Handbook no. 12. Agricultural Research Council. Pretoria
- Henning, G.A.,** Terblanche, R.F. & Ball, J.B. **2009.** South African Red Data Book: butterflies. SANBI Biodiversity Series 13. Pp. 158. South African National Biodiversity Institute, Pretoria.
- IUCN. 2009.** Red List of Threatened Species. IUCN Species Survival Commission, Cambridge Available: <http://www.iucnredlist.org/> (Accessed 17/03/2012).
- Kuntonen-van't Riet, J. 2007.** Strategic review of the status of biodiversity management in the South African mining industry. Matrix + Consulting. South Africa
- Lötter, M. C. & Ferrar, A. A. 2006.** Mpumalanga Biodiversity Conservation Plan Map. Mpumalanga Parks Board, Nelspruit.
- Lubbe, W. (2011).** Usutu Colliery Wetland delineation Report. Strategic Environmental Focus (SEF 504206) (Draft)
- Manning, J. 2010.** Wild flowers of South Africa. Random Struik publishers. South Africa
- Mare, J. (2012).** Usutu Colliery Wetland delination Report. Menco (Wet/Usutu/2012/01 (R1) (Draft)
- Maze, K.,** Driver, A., Brownlie, S. **2003.** Mining and Biodiversity in South Africa: A discussion paper. In Driver A, Cowling, R.M., Maze, K. (2003) Planning for living landscapes: Perspective and lessons from South Africa.

Washington DC: Centre for Applied Biodiversity Science and Conservation. BotSoc. South Africa

Milton, S.J. 2004. Grasses as invasive aliens in South Africa. South African Journal of Science 100. Pp 69-75

Mucina, L., Rutherford, M. C. & Powrie, L. W. 2005. Vegetation Map of South Africa, Lesotho and Swaziland. South African National Biodiversity Institute. ISBN 1-919976-22-1

Mpumalanga DACE. 2003. 2003 Mpumalanga State of Environment Report. Mpumalanga Department of Agriculture, Conservation and Environment, Nelspruit

Natural Scientific Services CC (2011), Usutu Eskom Biodiversity Assessment Report (Draft)

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A., Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute. Pretoria

Richardson, D.W., van Wilger, B.W. 2004. Invasive Alien Plants in South Africa: How well do we understand the ecological impacts. South African Journal of Science 100. Pp 45-52

Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B., Cowling, R.M., Mucina, L. & Rutherford, M. 2004. South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. South African National Biodiversity Institute, Pretoria.

Sinclair, I., Hockey, P., Tarboton., W. 2002. Sasol Birds of Southern Africa. Struik publishers, South Africa

Taggart K., Abell, S., Cauldwell, A., Clark, T., McEwan, K & Blignaut, T 2011. Eskom Usutu Biodiversity Assessment (Draft Report). Natural Scientific Services Consultation Company. South Africa

Tainton, N. 2000. Pasture Management in South Africa. University of Natal Press, Pietermaritzburg. South Africa

van Oudtshoorn, F. 1992. Guide to grasses of South Africa. Briza publishers, South Africa

van Oudtshoorn, F. 2002. Guide to grasses of Southern Africa. Briza publishers, South Africa

17. Annexure

17.1 IUCN Categories (Source: www.iucnredlist.org)

- **Critically Endangered (CR)** : A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
- **Endangered (EN)**: A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
- **Vulnerable (VU)**: A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
- **Near Threaten (NT)**: A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
- **Least Concern (LC)**: A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

17.2 Impact Assessment Categories

- **Nature of Impact** : The type of effect the project would have on the environment
- **Extent of the impact**: Understand whether the impact of the proposed project is limited to the study area and its immediate surrounding (**regional /national scale**)
- **Duration** : Indicate the life span of the impact (**short/ medium/ long**)
- **Consequences**: The degree to which the impact would change conditions or quality of the environment (**High/ Medium/Low**)
- **Probability of Occurrence**: The probability of the impact actually occurring (**Probable/ Improbable/ Highly Probable/ Definite**)
- **Confidence**: Expert confidence for the predicted impact based on available information (**High/Medium/Low**)

17.3 Input spatial Layers

- Mpumalanga Province in 1:50 000 national grids
- PNAT of Mpumalanga Province
- BGIS municipality biodiversity layers for Msukaligwa Local Municipality
- Googled map layer for site **26°35'S 30°05'E** with ecological assessed sites
- South African species of conservation concern and ecosystem status (accessed at www.sanbi.org.za on 16 February 2012)
- Mpumalanga Terrestrial Biodiversity Conservation Assessment Status map (accessed at www.sanbi.org.za on 05 April 2012)

17.4 Software used

- ArcMap-ArcInfo (ArcGIS v. 9.2, ESRI-SA)
- ArcMap-ArcEditor (ArcGIS v. 9.2, ESRI, SA)

17.5 Assessment of plant species

Plant species were assessed by:

- The ground cover in the sample area
- Assessment of visible plant species and digging (padding) through tall grass species to expose the ground lying and short plant species underneath.
- All plant species were identified using Oudtshoorn 1992 and 2002 **Guide to Grasses of South Africa**.
- Flowering plants were identified using Manning's 2010 **Wild Flowers of South Africa**.
- The alien and invasive problematic plants and weeds were identified using Bromilow's 2001 **Problem Plant of South Africa** and Henderson's 2004 **Alien weeds and invasive plants** textbooks.

17.6 Assessment of fauna

- Birds were visually assessed and identified using Sinclair *et al.*, 2002 Sasol Birds of Southern Africa guide, no trapping or mounting of mist net was attempted.
- Butterflies were also assessed visually and identified using the wings color patterns and confirm with SABCA virtual museum butterflies data base.

DISCLAIMER: No collection or preservation of the species was done during the study.

18. Glossary

Assessment: process of documenting, usually in measurable terms, knowledge, skills, attitudes and beliefs

Biodiversity: is the degree of variation of life forms within a given species, it is a measure of the ecosystem health

Breeding: is the reproduction OR producing of offspring by animals or plants

Checklist: Template useful to do list tips and task management

Colliery: A coal mine together with its physical plant and outbuildings

Conservation: movement aimed to protect animals, fungi, plants and their habitats.

Cryptophytes: collective word of geophytes, helophytes and hydrophytes

Displacement: the act or process of removing something from its usual or proper place or the state resulting to dislocation

Ecology: the relations that living organisms have with respect to each other and their natural environment

Ecosystem: is a biological system consisting of all the living organisms in a particular area and the nonliving organisms which the organisms interact

Endangered: species whose existence are being threaten by environmental effects

Floodplain: is a flat or nearly flat land adjacent a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge

Geophytes: plants that grow in dry area or part of the land

Gramnioids: Collective word for grass species

Habitat: an area or site where plants or animals persist or used

Helophytes: Plants that occupy marshy or pod edges

Herbaceous: plants with no persistent woody stem above the ground

Hydrophytes: plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content

Indicator species: species that indicate a specific condition

Invader: a species that is not indigenous to a particular area

Migration: Movement of species from one area to another

Noxious: a weed or plant proclaimed in the Weeds Act 42 of 1937

Pioneer: a plant capable of invading bare or undisturbed sites and persisting there until replaced by other species

Portion: a piece of land in an area distributed into small areas that are shared, commonly known as farm

Protection levels: Are areas of biodiversity importance that are formally and informally protected under NEMPA 57 of 2003

Rehabilitation: process of restoring a land to its original or near original after it has been used or disturbed

Riparian: area is the interface between land and a river or stream

Seepage: The slow escape of a liquid or gas through porous material or small holes.

Vulnerability: are species whose status is vulnerable or sensitive to the environmental conditions in an area where it persist

Waterlogged: saturation of the soil by groundwater sufficient to prevent or hinder agriculture

Wetlands: Wetlands are considered as those ecosystems defined by the National Water Act (NWA) as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.” However, there are two definitions used to define what a wetland is; according to NWA a wetland is a hydrological zone that would be present without human modification. Whereas RAMSAR Convention defines a wetland as areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. For this study, the wetlands observed are considered as the one that are defined by the RAMSAR even though the ecosystem is best defined using NWA definition.

19. Appendices

Appendix 1: List of international agreements and frameworks for biodiversity conservation and management.

Convention	Purpose
The Convention on Biological Diversity (CBD) 1993 (5)	Signed by South Africa in 1995 provides broad principles for the conservation of biodiversity, sustainable use of its components and fair and equitable sharing of benefits arising from genetic resources. The CBD is being implemented through several national policies and laws, including the National Biodiversity Strategy and Action Plan 2005 (NBSAP), the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004; NEMBA) and the Protected Areas Act, 2003 (Act No. 57 of 2003 as amended 2005).
<i>Cartagena Protocol on Biosafety</i> , 2000 (6)	Ratified by South Africa in 2003, is a supplementary agreement to the CBD. The Protocol seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. This protocol will be implemented through the Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997), which is currently under review, to incorporate the protocol's requirements.
<i>Cites Convention on international trade in endangered species of wild fauna and flora</i> 1973 (8)	Ratified by South Africa 1975. Cites was developed to control international trade in wildlife and wildlife products in order to prevent over exploitation and extinction of species. This convention is implemented through the NEMBA.
<i>UN Framework Convention on Climate Change (UNFCCC), 1994 and the Kyoto Protocol</i> 1997 (12)	The UNFCCC was ratified by South Africa in 1997 and the Kyoto Protocol in 2002. The UNFCCC sets out an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It is based on the understanding that the climate system is a shared resource, which is affected by global industrial and other emissions of carbon dioxide and other greenhouse gases. Signatories to the UNFCCC commit to gathering and sharing information on greenhouse gas emissions, policies and best practice, developing and implementing national strategies to address greenhouse gas emissions and the

needs to adapt to expected impacts as well as to cooperate in preparing for adaptations to the impacts of climate change. The Kyoto Protocol was developed to strengthen the UNFCCC by setting legally binding greenhouse gas emission reduction targets for Annex I countries. However, South Africa is a non-Annex I country and does not have limits set in the original round of negotiations. It is anticipated that carbon limits will be introduced for the non-Annex I countries that are high carbon emitters, (such as South Africa) in the next round of negotiations in 2012. South Africa is addressing the UNFCCC commitments through a Climate Change Response Strategy, which was launched in October 2004.¹³

United Nations Convention to Combat Desertification (UNCCD) 1994 (15) Ratified by South Africa in 1997. Signatories to the UNCCD commit to prepare and implement action programmes to prevent land degradation. The objective is to combat desertification and mitigate the effects of drought, particularly in countries experiencing severe droughts and desertification through effective action at all levels, supported by international cooperation and partnerships. South Africa is addressing the commitments of the UNCCD through a national action programme.

World Heritage Convention 1972 (17) Ratified by South Africa in 1997, was developed to establish an effective system of collective protection of natural and cultural heritage sites that are deemed to have universal importance. South Africa has seven such sites. Six of these are natural heritage sites with high biodiversity value. This convention is implemented through the World Heritage Convention Act, 1999 (Act No. 49 of 1999).

Appendix 2: List of South African legislation pertaining to the biodiversity conservation and management

Acts	Purpose
<i>The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</i>	The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Section 24 of this chapter states that "Everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.
<i>National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998)</i>	NEMA replaces a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4)a specifies that "sustainable development requires the consideration of all relevant factors including the following aspects specifically relevant to biodiversity": <ul style="list-style-type: none">• The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimized and remedied;• The development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized;• A risk-averse and cautious approach is applied, which takes into account the limits of current

- knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimized and remedied.
 - The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
 - Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Of particular importance are the Environmental Impact Assessment (EIA) regulations of the Act, which identify activities that may have a substantial detrimental effect on the environment. The identification of these activities results in the activity being prohibited unless the competent authority has granted a written authorization after the consideration of an environmental impact assessment or basic assessment. Mining has been included in these regulations but will only come into effect on 1 July 2007. Importantly, the overlapping authorization processes described in both NEMA and the MPRDA still needs to be clarified

National Environmental Management Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004)

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bio-prospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA. The Act also gives effect to international Strategic Review of the Status of Biodiversity Management in the South African Mining Industry agreements relating to biodiversity. The Act states that the Minister of Environmental Affairs and Tourism may identify any process or activity in a listed ecosystem as a threatening process and will, thereafter, be regarded as an activity contemplated in Section 24(2)(b) of NEMA which states that:

- (a) Specified activities may not be commenced without prior authorization from the Minister or MEC and specify such activities. This Act allows for any person, organization or organ of

state to contribute to biodiversity management. Such a party may submit to the Minister a draft management plan for an ecosystem or species. Should the Minister approve the management plan, an agreement can be entered into in regards the implementation of the plan.

- (b) The NEMBA established the South African National Biodiversity Institute (SANBI) and gives it a mandate in regards the monitoring, advising and co-coordinating biodiversity issues in South Africa.
- (c) The NEMBA calls for the development of a National Biodiversity Framework and sets the stage for bioregional plans. It also calls for the protection of threatened ecosystems and species, the control of alien invasive species, genetically modified organisms and regulates bio-prospecting.

National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004): Threatened or protected species regulations The DEAT published the Threatened or Protected Species Regulations, developed in terms of NEMBA, on 23 February 2007. These regulations set the rules for hunting, and, for example, prohibit canned game hunting.

The Minerals and Petroleum Resource Development Act (MPRDA), 2002 (Act No. 28 of 2002) According to the MPRDA, any prospecting or mining operations must not result in unacceptable pollution, ecological degradation or damage to the environment and must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of projects. Section 37 (1) of the MPRDA acknowledges that the principles set out in Section 2 of the NEMA, apply to all prospecting and mining operations and serve as guidelines for the interpretation, administration and implementation of the environmental requirements of this Act. In addition, mining right holders must give effect to the objectives of integrated environmental management as laid out in Chapter 5 of the NEMA. The MPRDA also obliges the owner of the mining right to rehabilitate disturbed areas and holds the owner responsible for any environmental degradation on his site.

National Environmental Management: Air Quality Act (NEMAQA), 2004 (Act No. 39 of 2004) The law relating to air pollution in South Africa is in the process of being reformed. The Atmospheric Pollution Prevention Act (APPA), 1965 (Act No. 45 of 1965), which largely governed point-source emission control and therefore did not take into consideration the cumulative impacts of air

2004)

pollution, has been repealed by the NEMAQA. Amongst other objectives, the Act provides for the “prevention of air pollution and ecological degradation”

***The Environment Conservation Act (ECA), 1989
(Act No. 73 of 1989)***

ECA provides for the protection and control of the environment. Following the enactment of NEMA, NEMBA, NEMPAA and NEMAQA, a number of the provisions of the Environment Conservation Act have been repealed. The remaining provisions of the Act deal with littering, waste-management and regulations on noise, vibration and shock.

***Conservation of Agricultural Resources Act
(CARA), 1983 (Act No. 43 of 1983)***

South Africa has numerous problematic alien invaders, such as black wattle, lantana and queen of the night. CARA sets out to combat invasive plants. The Act categorizes weeds into three categories, with varying degrees of action required for each category of weeds. CARA is currently in the process of being revised. In addition the drafting of new regulations on alien and invasive species for the National Environmental Management: Biodiversity Act (NEMBA), Act 10 of 2004 is in progress.

Appendix 3: List of policy and frameworks associated with biodiversity conservation and management

Policy	Purpose
<i>Bioregional Plans</i>	Aims to provide maps of biodiversity priorities with accompanying land-use planning and decision making guidelines in order to inform decisions associated to land-use planning, environmental assessment, natural resource management and authorization.
<i>Biodiversity Management Plans</i>	BMP's ensure the long term survival in nature of species; to provide the responsible person or organ of state effective monitoring and reporting on species progress and to be consistent with acts, frameworks and applicable bioregional plans or any plans issued in terms of Chapter 3 of the NEMA or any municipal integrated development plans etc.
<i>National Biodiversity Strategy and Action Plans</i>	NBSAP goal is to conserve and managed terrestrial and aquatic biodiversity to ensure a sustainable and equitable benefits
<i>National Biodiversity Assessment*</i>	Formerly known as NSBA which is a systematic biodiversity planning approach that aims to give a comprehensive biodiversity assessment (previously it focused on spatial only) throughout the country. Its focus is to mainstream biodiversity priorities throughout the economy and making links between biodiversity and socio-economic development.
<i>Mpumalanga Nature Conservation Act (Act 10 of 1998)</i>	Act makes provision with respect to nature conservation in the Mpumalanga province. It provides for protection of wildlife, hunting, fisheries, protection of endangered fauna and flora as listed in the Convention on international Trade in Endangered Species of Wild Fauna and Flora, the control of harmful animals, freshwater pollution and enforcement.
<i>Mpumalanga Tourism and Parks Agency (Act 5 of 2005)</i>	Aims to promote and sustainably manage tourism and nature conservation; and provide sustainable use of natural resources
<i>Mpumalanga Department of Agriculture, Conservation and Environment (State of the province Environment)</i>	Provide information on the current state of the environment, what is causing environmental change and what is being done about it. The aim is to improve understanding of environmental issues, and to give guidelines for sound general management.

Appendix 4: USUTU Colliery Ecological snapshots











Appendix 5: Floral diversity snapshots observed within and around USUTU mining area















Appendix 6: Animal holes, spoors and droppings observed at USUTU





Appendix 7: Environmental impacts associated with mining observed at USUTU





