



# **EkoInfo CC** **Environmental & Wildlife Management** **Consultancy**

CC 95/34111/23

Assessing your Environment

West Dune Properties 131 Pty (Ltd)  
88 Rubida Street  
Murrayfield X 1  
Pretoria  
Gauteng, RSA

P.O. Box 72847  
Lynwood Ridge  
Pretoria  
0040

Tel: 012-365-5433  
Fax: 012-363-3277  
Inter: +2712-363-2466  
E-mail: wdefrey@ekoinfo.co.za  
Http://www.ekoinfo.co.za

1995 - 2015

05 July 2018

Our reference: EkoInfo CC Wetland Verification Study Witbank

Lourens de Villiers

Labesh

Dear Sir

## **Re: Wetland Presence/ Absence Verification – Del Judor Development, eMalahleni, Mpumalanga**

Thank you for the opportunity to assist you with a wetland presence/ absence verification study for a portion of land within the Del Judor area in eMalahleni, Mpumalanga Province (Figure 1). The approximate extent of the area is 1.5647 ha.

Wetlands are defined on a national level within the National Water Act (Act No 36 of 1998):

- a. Wetland - means 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.
- b. Within the same act, wetlands are included in the definition of a watercourse – means:
  - (a) a river or spring;
  - (b) a natural channel in which water flows regularly or intermittently;
  - (c) a wetland, lake or dam into which, or from which, water flows; and
  - (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

The same definitions are used in the National Environmental Management Act (Act No 107 of 1998), Environmental Impact Assessment (EIA) Regulations (December 2014). Therefore the definition transgress

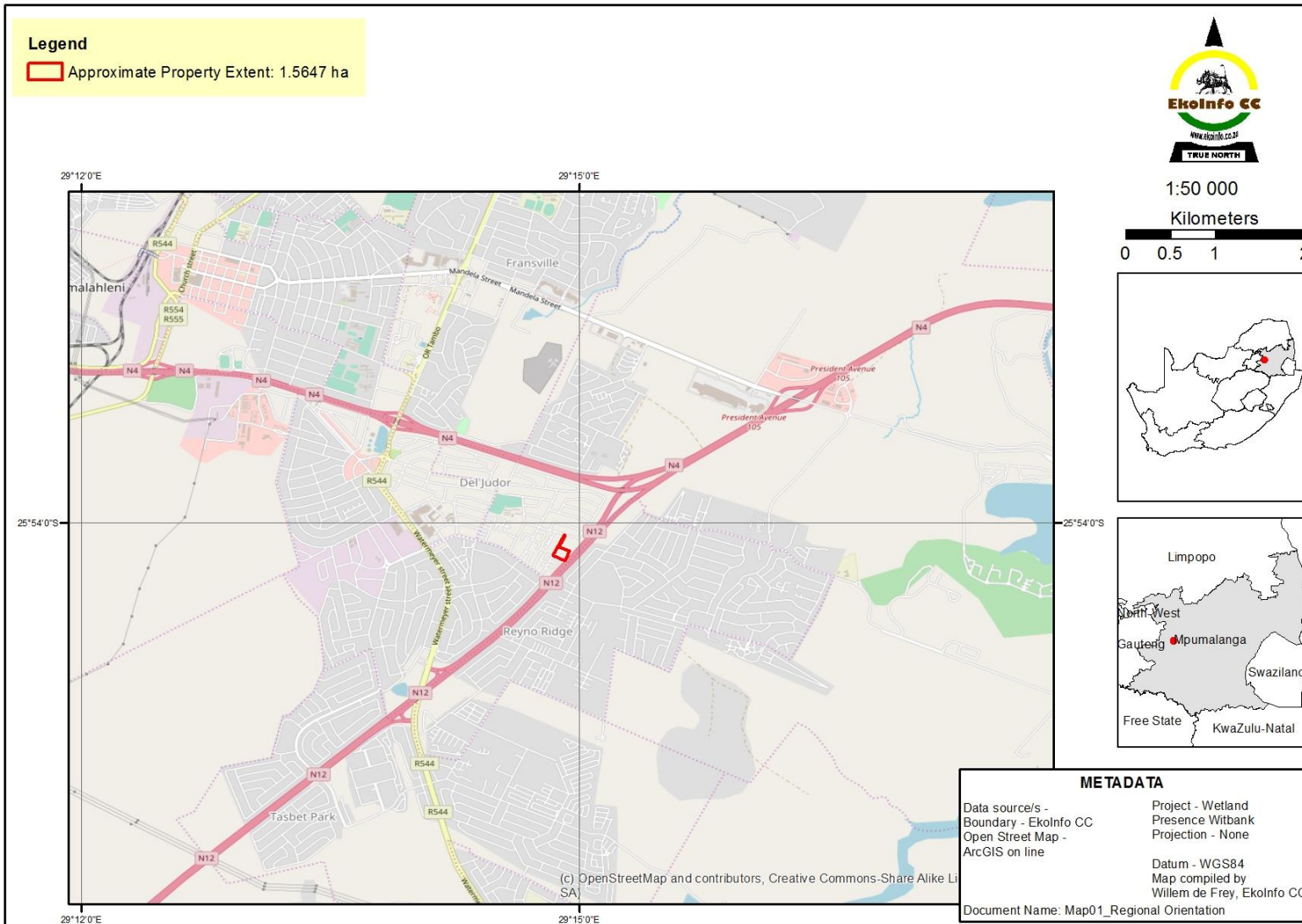
### **EkoInfo's services:**

Environmental Impact Assessments  
Environmental Management Program Reports  
Environmental Monitoring/ Auditing  
Game or Livestock Management Reports  
Geographic Information Analysis/ Management

### **EkoInfo's products:**

Soil surveys  
Flora surveys  
Fauna surveys  
Natural Resource Maps  
Natural Resource Data

Member: W.H. de Frey (MSc Wildlife Management – UP, Pr.Sci.Nat.)



**Figure 1: Regional orientation of the study area in the Del Judor area, eMalahleni, Mpumalanga Province**

across two national acts which governs the conservation and management of wetlands. To verify the presence of wetlands within a proposed development footprint is of significance, because construction activities within 32 meters of wetland triggers listed activities in terms of the EIA regulations.

Ecologically wetlands represent a type of aquatic system, because water is the main driver of ecological processes within the system. Depending on the source, chemical composition, volume and duration of the water different wetlands will develop (Hasler 1975, Denny 1985, Cowan 1995, DWAF 2005, Ewart-Smit et al 2006). Therefore it should be apparent that the appearance and location of wetlands will vary according to climate and geology across a continent, as the two factors determines the topography within the landscape over time, which eventually determine the properties of the soil, vegetation and animals present.

In 2005, the Department of Water Affairs released a guideline document (DWAF 2005) for the delineation of wetlands, which has mainly relevance to the non-arid areas of South Africa, in other words where rainfall annually exceeds 400 mm.

The guideline document sets the following criteria to be considered for wetland delineation:

1. Topography
2. Soil
3. Vegetation

According to these criteria, wetlands are expected to occur in lowlying areas (footslopes and valleybottoms), with soils which show signs of temporary or permanent saturation (hydromorphic) with plants adapted to growing in saturated or over saturated conditions (hydrophytes). However, the landscape is three dimensional with landscape features repeating themselves at various scales. Therefore wetlands can topographically develop in any area within the landscape where the topography/ relief is lower than the adjacent land. These depressions can be open (exoheric – typically streams) or closed (endoheric – typically pans), and whether a wetland will develop, will depend on whether sufficient water (rainfall, fountain, water table, human infrastructure) occurs in the catchment which surround the depression. The water can enter the depression either directly (rainfall event) or indirectly (run off or through the soil). If the water remains in the depression for a prolonged period, the soil and vegetation will reflect this influence, resulting in permanent, seasonal and temporary zones within and along the depression.

It was these indicators of wetlands that was investigated on the 30<sup>th</sup> of May 2018. The survey team consisted of Willem de Frey, a registered scientific professional in the fields of ecological – and botanical science, with more than 20 years' experience and a field assistant. A soil auger was used to classify the soil based on location determined from the SAGA wetness index derived from 5 m contours (Figure 2). Six plots were sampled across the study area, which included the soil properties (form, depth and texture) (Appendix A) and

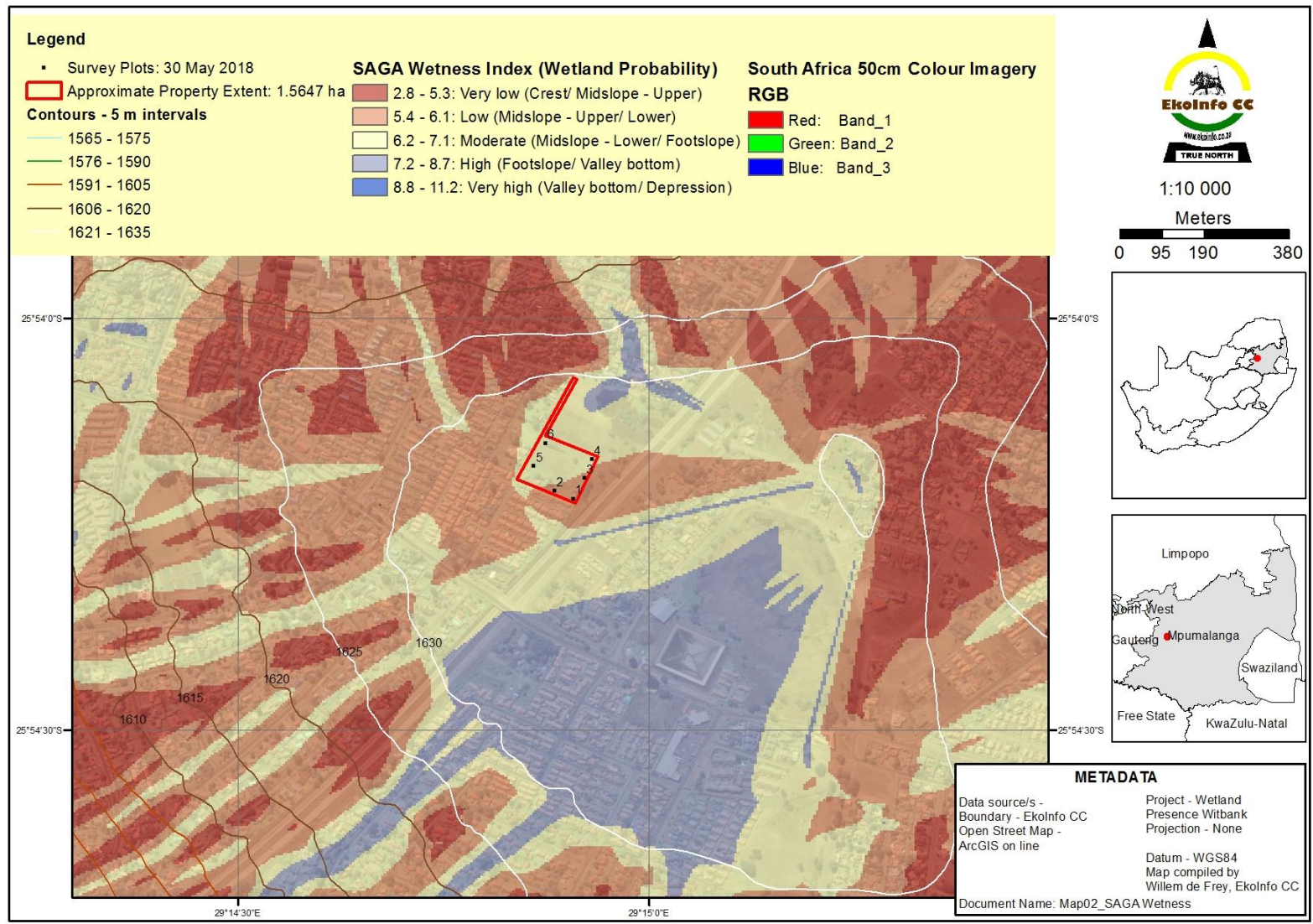


Figure 2: Wetland potential within the study area based on the SAGA wetness index derived from 5 m contours



vegetation species (Appendix B) observed. Unfortunately the area had been mowed prior to the survey, making the identification of species difficult, therefore the vegetation list cannot be considered comprehensive (Appendix C).

Due to the wetness index indicating the potential for wetlands to be present from low to moderate for most of the study area (property), the areas was surveyed to verify the low probability. The soil forms and vegetation observed confirmed the absence of wetlands from the area. The soils observed were mainly Mispah (orthic A horizon on hard rock), with two of the plots surveyed representing Pinedene soils (Orthic A horizon on yellow-brown apedal B horizon with unspecified material with signs of wetness). Mispah soils are associated with pedologically, young landscape, commonly found along crests, as the crests represents the remnants of the pedepanation (levelling) process, while the Pinedene soils are listed as representing temporary or seasonal wetland soils (Soil classification workgroup 1991, DWAf 2005). However, if the signs of wetness were absent from these two profiles, they would have been classified as shallow Clovelly soils. The absence of mottles in these two profiles highlights the absence of soil water movement in these profiles, but the water is rather moving on the contact between the soil and the underlying rock (shale). The absence of anaerobic soil conditions is confirmed by the red/ darker colour of the soils surveyed in the upper part (Appendix C), with the lighter (greyish) near the bottom - most soils which experienced prolonged water logging (saturation), have a greyish colour due to removal of the iron and manganese elements from the soil profile (DWAf 2005). The source of the water moving along the bottom (contact) of the profile is most probably from the water used to irrigate the vegetation, as the area had been used for pasture. The water only accumulates when the soil profile was over saturated after extensive periods of irrigation and rain, allowing for water to drain out of the profile on to the underlying rock. Due to the slope of the landscape, the water moves then laterally along the contact towards the south or southwest. The depth of these two soil profiles allow for the soil moisture to quickly drain out of the upper 50 cm, while accumulating in the lower areas, which explains the absence of mottles within 50 cm of the surface, while signs of wetness is present at the bottom.

The vegetation also reflects this absence of waterlogged soil conditions, with the species observed, associated with terrestrial and disturbed conditions. The study area is located within the Endangered Rand Highveld Grassland (Figure 3), which is a regional terrestrial ecosystem, the species observed during the site visit, are associated with this system (Appendix D). Appendix D also lists those species to be expected to occur within Eastern Temperate Freshwater Wetlands (Mucina & Rutherford 2006), with the exception of two grasses, none of these species were recorded within the study area, thereby confirming the absence of wetlands conditions within the study area. The majority of the species are either weeds or pioneer species (Appendix B), which confirms the modified status of the vegetation.

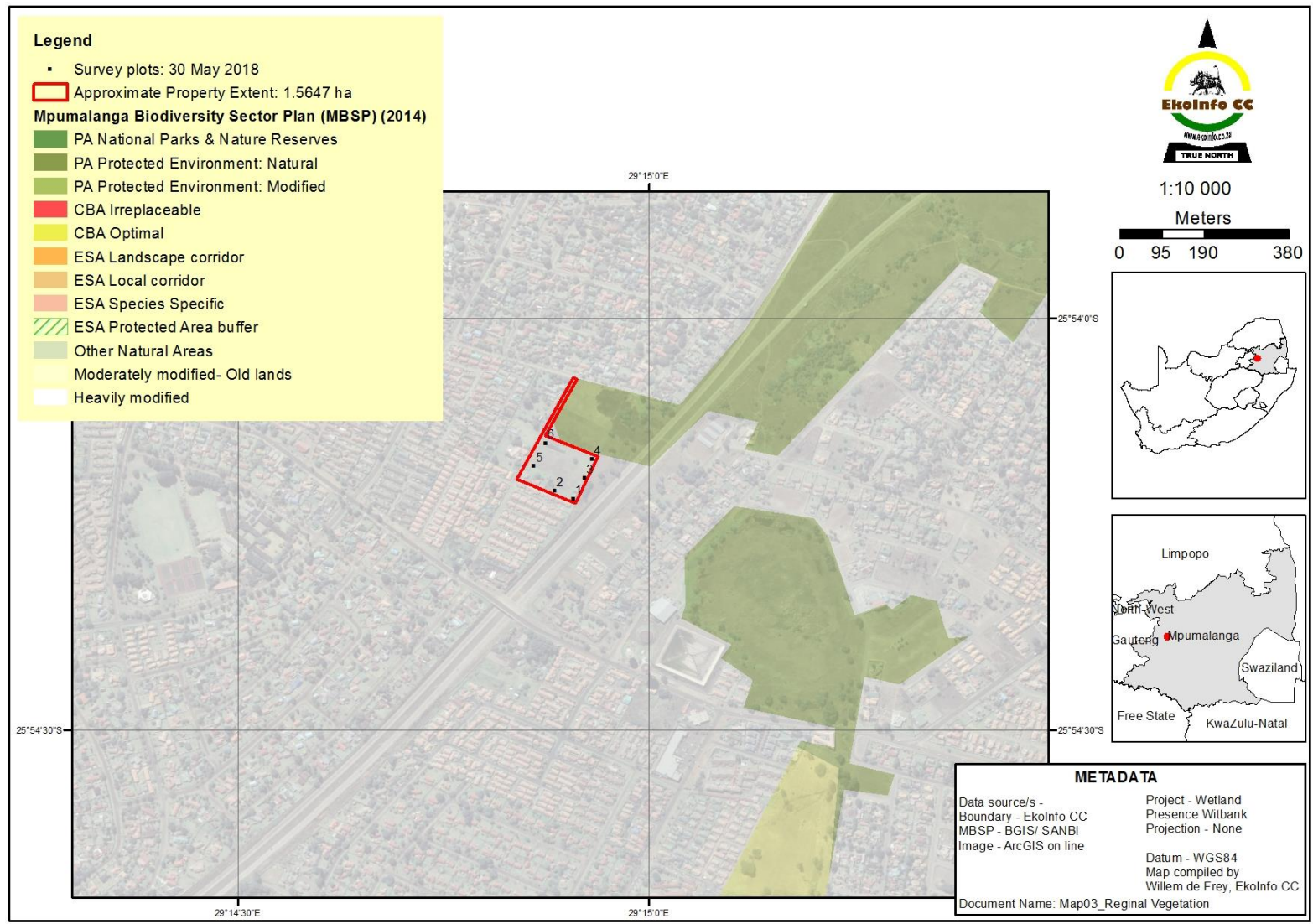


Figure 3: Regional vegetation unit associated with the study area

## **EkoInfo CC - Assessing Your Environment**

---

Mpumalanga Province Biodiversity Sector Plan (2014) (Figure 3) also confirms the modified status of the vegetation within the study area.

Therefore this study confirmed that there are no wetlands present within the study area, and the vegetation present consists mainly of species associated with pastures in a modified landscape.

Please do not hesitate to contact me should you have any queries.

Regards



Willem de Frey  
(Pr.Sci.Nat. – Ecological & Botanical Science  
Sole member & principal consultant – EkoInfo CC)

### **Literature Review**

COWAN, G.I. (ed) 1995. Wetlands of South Africa. Department of Environmental Affairs and Tourism, Pretoria.

DENNY, P. 1985. The ecology and management of African wetland vegetation. Dr. W. Junk Publishers, Dordrecht.

DWAF. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Department of Water Affairs and Forestry

EWART-SMITH, J., OLLIS, D., DAY, J & MALAN, H 2006. NATIONAL WETLAND INVENTORY: Development of a Wetland Classification System for South Africa. The Water Research Commission (WRC)

HASLER, A.D. 1975. Coupling of land and water systems. Berlin, Springer

MUCINA, L. & RUTHERFORD, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

READ, H.H. & WATSON, J. 1968. Introduction to Geology Volume 1. Principles. 2nd ed. Macmillan Press LTD, London.

SOIL CLASSIFICATION WORKGROUP 1991. Soil classification a taxonomic system for South Africa. Memiors oor die Natuurlike Landbouhulpbronne van Suid-Afrika Nr. 15.

STRAHLER A. N. & STRAHLER A. H. 1987. Modern Physical Geography. John Wiley & Sons. New York

\



## APPENDIX A – SURVEY RESULTS

Plot no	1	2	3	4	5	6
Database/ Relevé number:	101	102	103	104	105	106
Date (yy/mm/dd):	2018-05-30	2018-05-30	2018-05-30	2018-05-30	2018-05-30	2018-05-30
Surveyor:	wdf	wdf	wdf	wdf	wdf	wdf
Photo no:	063- 066, 067	068- 071, 072	073- 076, 077	078- 081, 082	083- 086, 087	088- 091, 092
Photo direction (Bearing):	n, e, s, w, soil	n, e, s, w, soil	n, e, s, w, soil	n, e, s, w, soil	n, e, s, w, soil	n, e, s, w, soil
Notes	awits01 - hypa ir acac mea, mowed	awits02 - erag pla - popu spp	awits03 - erag pla pasture	awits04 - erag pla pasture	awits05 - erag pla pasture	awits06 - erag pla pasture
Altitude (m):	1645	1645	1644	1642	1640	1639
Aspect (Bearing):	w	w	e	w	w	n
Slope (%):	2	1	1	1	1	1
Terrain unit	Crest	Crest	Crest	Crest	Crest	Crest
Local topography:						
Stratigraphy:						
Petrology:						
Lithology:					shale	
Soil form	Mispah	Pinedene	Pinedene	Mispah	Mispah	Mispah
Termitaria present	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Cover: Gravel -	0	0	0	0	0	0
Cover: Small stones -	0	0	0	0	0	0
Cover: Medium stones -	0	0	0	0	0	0
Cover: Large stones -	0	0	0	0	0	0
Rock:	0	0	0	0	0	0
Soil depth (mm):	100	1000	1100	250	200	280
Erosion categories						
Surface crusting:	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Estimate % Clay (A-horizon):	12	12	12	9	9	9
Cover total (%):	95	95	95	95	95	95
Cover tree layer (%):	0	0	0	0	0	0
Cover shrub layer (%):	0	0	0	0	0	0
Cover herb layer (%):	95	95	95	95	95	95
Cover grass layer (%):	85	85	85	85	85	85
Cover forbs layer (%):	20	10	10	10	10	10
Cover open water (%):	0	0	0	0	0	0
Cover bare rock (%):	0	0	0	0	0	0
Height (highest) trees (m):	0	0	0	0	0	0
Height lowest trees (m):	0	0	0	0	0	0
Height (highest) shrubs (m):	0	0	0	0	0	0

## **Ekoinfo CC - Assessing Your Environment**

<b>Plot no</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Database/ Relevé number:</b>	<b>101</b>	<b>102</b>	<b>103</b>	<b>104</b>	<b>105</b>	<b>106</b>
Height lowest shrubs (m):	0	0	0	0	0	0
Aver height (high) herbs (cm):	2.5	5	2.5	2.5	2.5	2.5
Aver height lowest herbs (cm):	2.5	5	2.5	2.5	2.5	2.5
Maximum height herbs (cm):	5	10	5	5	5	5

## APPENDIX B – SURVEY DATA: VEGETATION LIST

Note: weed or pioneer species in *italics*

Plot no	1	2	3	4	5	6
Species/ Database no	101	102	103	104	105	106
Acacia karroo		1				
Acacia mearnsii	1					
<i>Bidens pilosa</i>		+				
Commiphora africana var. africana	+					
<i>Conyza bonariensis</i>		+				
<i>Conyza podocephala</i>	+		+		+	
<i>Crepis hypochaeridea</i>					+	+
<i>Cynodon dactylon</i>	+				+	
<i>Eragrostis curvula</i>		+				
<i>Eragrostis plana</i>	+	2a	2a	2b	3	2a
<i>Gomphrena celosioides</i>					+	
Helichrysum rugulosum	+				+	
<i>Hyparrhenia hirta</i>	3			+	+	
<i>Leonotis ocymifolia</i>		+				
<i>Nidorella hottentotica</i>				+		
<i>Paspalum dilatatum</i>	+		+	+	+	+
<i>Pennisetum clandestinum</i>	+			+		
Populus species (102_1487)		+				
Rhus pyroides var. pyroides				1		
<i>Richardia brasiliensis</i>					+	
<i>Solanum giganteum</i>		2a				
Walafrida densiflora	+					
Zornia milneana						+

## APPENDIX C – GEOREFERENCED DIGITAL PHOTOGRAPHS TAKEN PER SURVEY PLOT



DSC00063



DSC00064



DSC00065



DSC00066



DSC00067



DSC00068



DSC00069



DSC00070



DSC00071



DSC00072



DSC00073



DSC00074



DSC00075



DSC00076



DSC00077



DSC00078



DSC00079



DSC00080



DSC00081



DSC00082



DSC00083



DSC00084



DSC00085



DSC00086



DSC00087



DSC00088



DSC00089



DSC00090



DSC00091



DSC00092



## Ekoinfo CC - Assessing Your Environment

### APPENDIX D – LISTED OF EXPECTED VEGETATION ASSOCIATED WITH REGIONAL VEGETATION UNITS ASSOCIATED WITH TERRESTRIAL AND AQUATIC ECOYSTEMS

Note: Species in **Bold** were observed during the survey on the 30<sup>th</sup> of May 2018

Ecosystem	Terrestrial	Aquatic (Riparian fringe/ Wetlands)	
Botanical Name	Rand Highveld Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
Acalypha angustata	1		1
Acanthospermum australe	1		1
Agapanthus inapertus subsp. pendulus	1		1
Aloe greatheadii var. davyana	1		1
Anacampseros subnuda subsp. lubbersii	1		1
Andropogon schirensis	1		1
Anthospermum rigidum subsp. pumilum	1		1
Aristida aequiglumis	1	1	2
Aristida congesta subsp. congesta	1		1
Aristida junciformis subsp. galpinii	1		1
Bewsia biflora	1		1
Boophone disticha	1		1
Brachiaria nigropedata	1		1
Brachiaria serrata	1		1
Bulbostylis burchellii	1		1
Chamaecrista mimosoides	1		1
Cheilanthes hirta	1		1
Crassula arborescens subsp. undulatifolia	1		1
Ctenium concinnum	1		1
Cymbopogon excavatus	1		1
<b>Cynodon dactylon</b>	1		1
Delosperma purpureum	1		1
Dicoma anomala subsp. anomala	1		1
Dicoma zeyheri subsp. zeyheri	1		1
Digitaria monodactyla	1		1
Digitaria tricholaenoides	1		1
Diheteropogon amplexens var. amplexens	1		1
Elephantorrhiza elephantina	1		1
Elionurus muticus	1		1
Encephalartos lanatus	1		1
Encephalartos middelburgensis	1		1
Eragrostis capensis	1		1
Eragrostis chloromelas	1		1
<b>Eragrostis curvula</b>	1		1
Eragrostis gummiflua	1		1
<b>Eragrostis plana</b>	1	1	2
Eragrostis racemosa	1		1
Eucomis vandermerwei	1		1

## ekoInfo CC - Assessing Your Environment

Ecosystem	Terrestrial	Aquatic (Riparian fringe/ Wetlands)	
Botanical Name	Rand Highveld Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
<i>Frithia humilis</i>	1		1
<i>Haemanthus humilis</i> subsp. <i>humilis</i>	1		1
<i>Helichrysum caespititium</i>	1		1
<i>Helichrysum nudifolium</i> var. <i>nudifolium</i>	1		1
<b>Helichrysum rugulosum</b>	1		1
<i>Heteropogon contortus</i>	1		1
<i>Huernia insigniflora</i>	1		1
<b>Hyparrhenia hirta</b>	1		1
<i>Hypoxis rigidula</i> var. <i>pilosissima</i>	1		1
<i>Indigofera comosa</i>	1		1
<i>Ipomoea crassipes</i>	1		1
<i>Justicia anagalloides</i>	1		1
<i>Kohautia amatymbica</i>	1		1
<i>Lactuca inermis</i>	1		1
<i>Ledebouria ovatifolia</i>	1		1
<i>Lopholaena coriifolia</i>	1		1
<i>Loudetia simplex</i>	1		1
<i>Melanospermum rudolfii</i>	1		1
<i>Melhania randii</i>	1		1
<i>Melinis nerviglumis</i>	1		1
<i>Melinis repens</i> subsp. <i>repens</i>	1		1
<i>Microchloa caffra</i>	1		1
<i>Monocymbium ceresiiforme</i>	1		1
<b>Nidorella hottentotica</b>	1		1
<i>Oldenlandia herbacea</i> var. <i>herbacea</i>	1		1
<i>Oxalis corniculata</i>	1		1
<i>Panicum natalense</i>	1		1
<i>Pollichia campestris</i>	1		1
<i>Rhus magalismontana</i> subsp. <i>magalismontana</i>	1		1
<i>Rothea hirsuta</i>	1		1
<i>Schizachyrium sanguineum</i>	1		1
<i>Selago densiflora</i>	1		1
<i>Senecio coronatus</i>	1		1
<i>Setaria nigrirostris</i>	1		1
<i>Setaria sphacelata</i> var. <i>sphacelata</i>	1	1	2
<i>Sonchus dregeanus</i>	1		1
<i>Sporobolus pectinatus</i>	1		1
<i>Stoebe vulgaris</i>	1		1
<i>Themeda triandra</i>	1		1
<i>Trachypogon spicatus</i>	1		1
<i>Trichoneura grandiglumis</i>	1		1

## Ekoinfo CC - Assessing Your Environment

Ecosystem	Terrestrial	Aquatic (Riparian fringe/ Wetlands)	
Botanical Name	Rand Highveld Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
<i>Tristachya biseriata</i>	1		1
<i>Tristachya rehmannii</i>	1		1
<i>Urelytrum agropyroides</i>	1		1
<i>Vernonia oligocephala</i>	1		1
<i>Xerophyta retinervis</i>	1		1
<i>Agrostis lachnantha</i> var. <i>lachnantha</i>		1	1
<i>Andropogon appendiculatus</i>		1	1
<i>Andropogon eucomus</i>		1	1
<i>Aponogeton junceus</i>		1	1
<i>Ascolepis capensis</i>		1	1
<i>Berkheya radula</i>		1	1
<i>Berkheya speciosa</i> subsp. <i>speciosa</i>		1	1
<i>Berula erecta</i> subsp. <i>erecta</i>		1	1
<i>Carex acutiformis</i>		1	1
<i>Carex austro-africana</i>		1	1
<i>Carex schlechteri</i>		1	1
<i>Centella asiatica</i>		1	1
<i>Centella coriacea</i>		1	1
<i>Ceratophyllum demersum</i> var. <i>demersum</i>		1	1
<i>Chironia palustris</i> subsp. <i>palustris</i>		1	1
<i>Cordylogyne globosa</i>		1	1
<i>Crassula tuberella</i>		1	1
<i>Crinum bulbispermum</i>		1	1
<i>Cyperus congestus</i>		1	1
<i>Cyperus cyperoides</i> subsp. <i>cyperoides</i>		1	1
<i>Cyperus distans</i>		1	1
<i>Cyperus immensus</i>		1	1
<i>Cyperus longus</i> var. <i>longus</i>		1	1
<i>Cyperus marginatus</i>		1	1
<i>Disa zuluensis</i>		1	1
<i>Echinochloa holubii</i>		1	1
<i>Equisetum ramosissimum</i> subsp. <i>ramosissimum</i>		1	1
<i>Eragrostis micrantha</i>		1	1
<i>Eragrostis planiculmis</i>		1	1
<i>Falkia oblonga</i>		1	1
<i>Ficinia acuminata</i>		1	1
<i>Fimbristylis complanata</i>		1	1
<i>Fimbristylis ferruginea</i>		1	1
<i>Fuirena pubescens</i> var. <i>pubescens</i>		1	1
<i>Gladiolus papilio</i>		1	1
<i>Haplocarpha lyrata</i>		1	1

## Ekoinfo CC - Assessing Your Environment

Ecosystem	Terrestrial	Aquatic (Riparian fringe/ Wetlands)	
Botanical Name	Rand Highveld Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
Helichrysum difficile		1	1
Helichrysum dregeanum		1	1
Helichrysum mundtii		1	1
Helictotrichon turgidulum		1	1
Hemarthria altissima		1	1
Hydrocotyle sibthorpioides		1	1
Hydrocotyle verticillata		1	1
Hyparrhenia dregeana		1	1
Hyparrhenia quarrei		1	1
Imperata cylindrica		1	1
Ischaemum fasciculatum		1	1
Kniphofia ensifolia subsp. ensifolia		1	1
Kniphofia flammula		1	1
Kniphofia fluviatilis		1	1
Kniphofia linearifolia		1	1
Kyllinga erecta var. erecta		1	1
Lagarosiphon major		1	1
Lagarosiphon muscoides		1	1
Leersia hexandra		1	1
Lindernia conferta		1	1
Lobelia angolensis		1	1
Lobelia flaccida subsp. flaccida		1	1
Marsilea capensis		1	1
Marsilea farinosa subsp. farinosa		1	1
Mentha aquatica		1	1
Monopsis decipiens		1	1
Myriophyllum spicatum		1	1
Neobolusia tysonii		1	1
Nerine gibsonii		1	1
Nerine platypetala		1	1
Nymphaea lotus		1	1
Nymphaea nouchali var. caerulea		1	1
Nymphoides thunbergiana		1	1
Panicum schinzii		1	1
Paspalum dilatatum		1	1
Paspalum urvillei		1	1
Pennisetum sphacelatum		1	1
Pennisetum thunbergii		1	1
Phragmites australis		1	1
Potamogeton thunbergii		1	1
Pulicaria scabra		1	1
Pycnostachys reticulata		1	1



## EkolInfo CC - Assessing Your Environment

Ecosystem	Terrestrial	Aquatic (Riparian fringe/ Wetlands)	
Botanical Name	Rand Highveld Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
<i>Pycnus macranthus</i>		1	1
<i>Pycnus nitidus</i>		1	1
<i>Ranunculus multifidus</i>		1	1
<i>Rorippa fluviatilis</i> var. <i>caledonica</i>		1	1
<i>Rorippa fluviatilis</i> var. <i>fluviatilis</i>		1	1
<i>Rumex lanceolatus</i>		1	1
<i>Satyrium hallackii</i> subsp. <i>hallackii</i>		1	1
<i>Schoenoplectus corymbosus</i>		1	1
<i>Schoenoplectus decipiens</i>		1	1
<i>Scleria dieterlenii</i>		1	1
<i>Senecio inornatus</i>		1	1
<i>Senecio microglossus</i>		1	1
<i>Setaria pallide-fusca</i>		1	1
<i>Sium repandum</i>		1	1
<i>Thelypteris confluens</i>		1	1
<i>Typha capensis</i>		1	1
<i>Utricularia inflexa</i>		1	1
<i>Wahlenbergia banksiana</i>		1	1
<i>Xyris gerrardii</i>		1	1
Grand Total	84	100	184