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Environmental & Wildlife Management
Consultancy

CC 95/34111/23

Assessing your Environment

20 Years

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30 June 2018

Our reference: EkoInfo CC Wetland Verification Study Pierre van Rynveld

Lourens de Villiers

Labesh

Dear Sir

Re: Wetland Presence/ Absence Verification – Pierre van Ryneveld Development

Thank you for the opportunity to assist you with a wetland presence/ absence verification study for a portion of land within the Pierre van Ryneveld area in Gauteng Province (Figure 1). The approximate extent of the area is 4 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:

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Environmental Management Program Reports
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Soil surveys
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Natural Resource Maps
Natural Resource Data

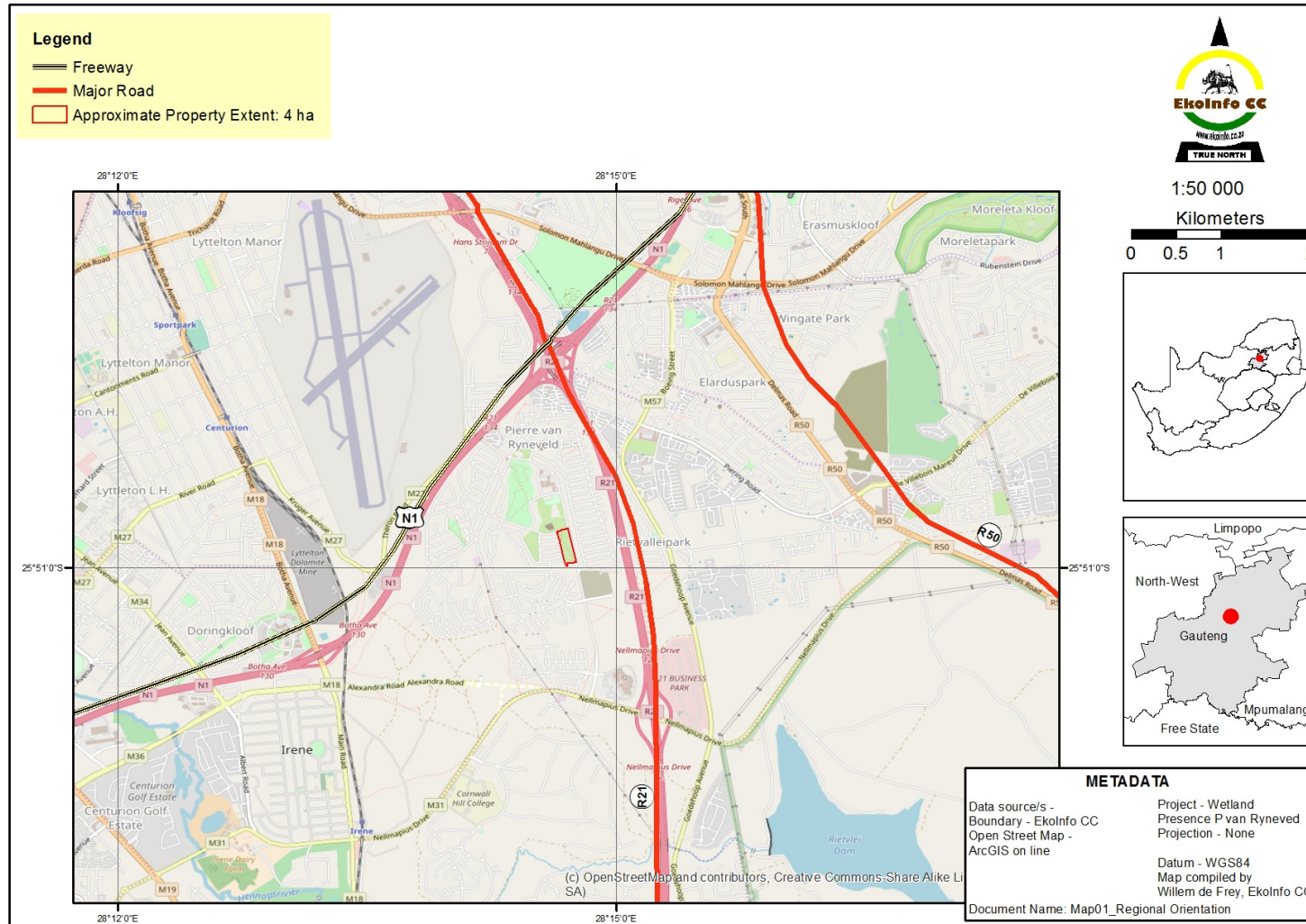


Figure 1: Regional orientation of the study area in the Pierre van Ryneveld area, Gauteng Province

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 1st of June 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). Eight plots were sampled across the study area, which included the soil properties (form, depth and texture) (Appendix A) and

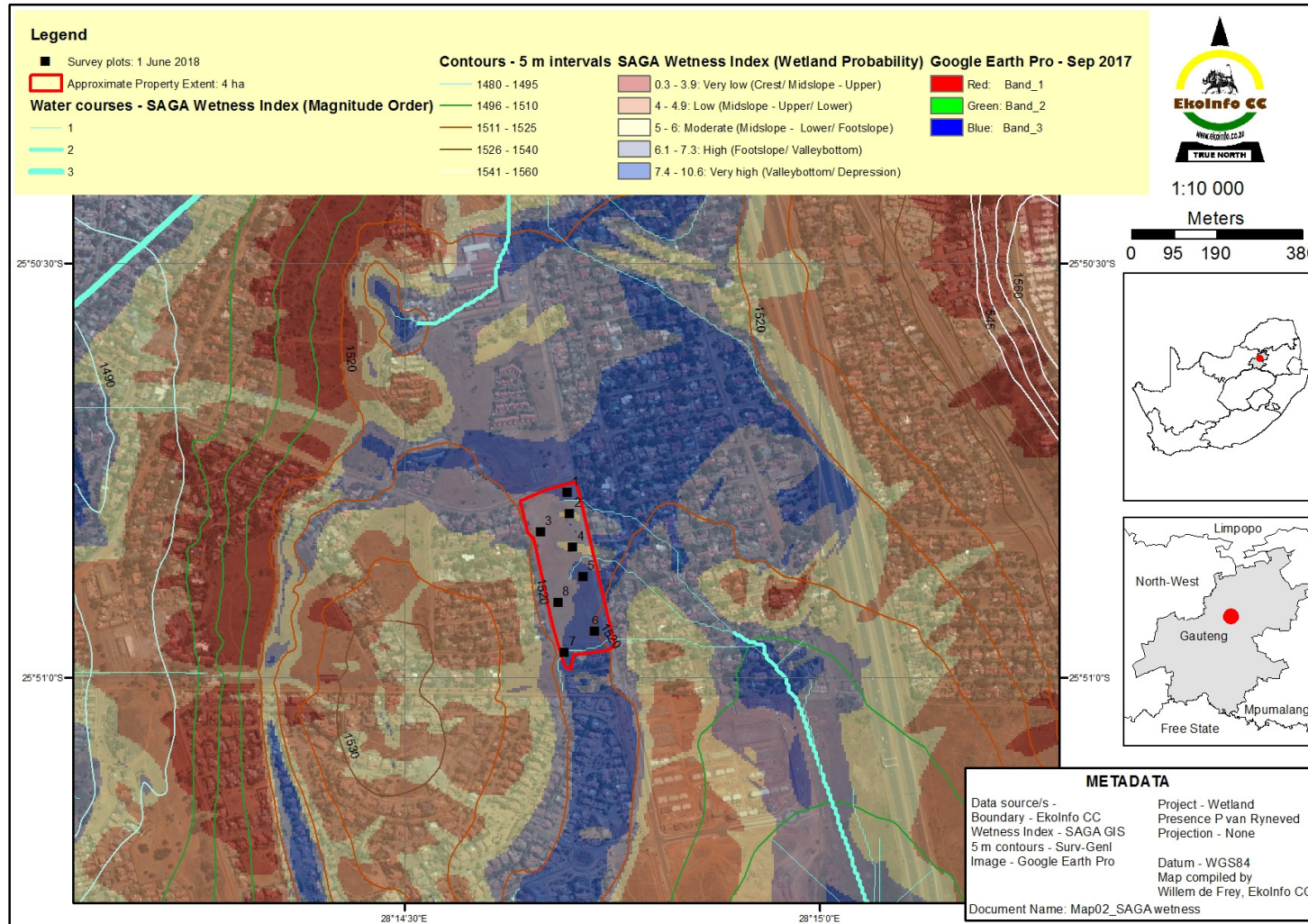


Figure 2: Wetland potential within the study area based on the SAGA wetness index derived from 5 m contours

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

Although the wetness index indicates the potential for wetlands to be present to be high to very high for most of the study area (property), the soil forms and vegetation observed indicates it not to be the case. The soils observed was mainly Mispah (orthic A horizon on hard rock), with only a single sample representing a Hutton soil (Orthic A horizon on red apedal B horizon). Neither of these soil forms are associated with wetland conditions, especially the Hutton soil is associated with deep, well drained soils (Soil classification workgroup 1991, DWAF 2005). The absence of anaerobic soil conditions is confirmed by the red colour of the soils surveyed (Appendix C), 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).

As would be expected, the vegetation reflects this absence of waterlogged soil conditions, with the species observed, associated with terrestrial and disturbed conditions. The study area is located within the Vulnerable Carletonville Dolomite 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.

Gauteng Province Department of Agriculture and Rural Development's (GDARD) Conservation Plan (Figure 3) also confirms the absence of wetland in this area, as wetlands are often associated with ecological support areas, if not included in important and irreplaceable areas (Critical Biodiversity Areas).

Therefore this study confirmed that there is no wetlands present within the study area.

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)

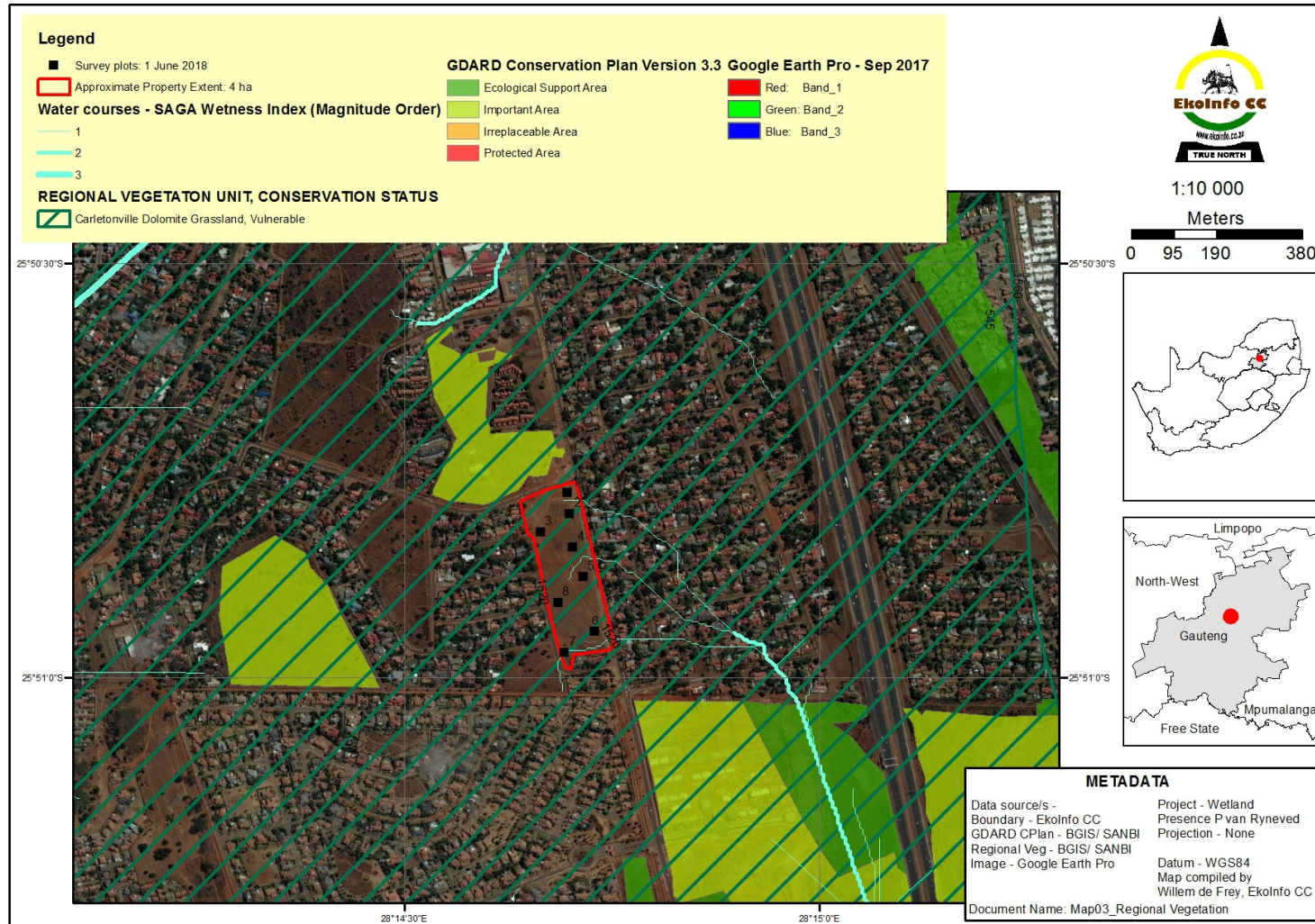


Figure 3: Regional vegetation unit associated with the study area

Literature Review

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APPENDIX A – SURVEY RESULTS

Plot no	1	2	3	4	5	6	7	8
Database/Relevé number:	301	302	303	304	305	306	307	308
Date (yy/mm/dd):	2018-06-01	2018-06-01	2018-06-01	2018-06-01	2018-06-01	2018-06-01	2018-06-01	2018-06-01
Surveyor:	wdf	wdf	wdf	wdf	wdf	wdf	wdf	wdf
Photo no:	001- 004, 005	006- 009, 010	010- 014, 015	016- 019, 020	021- 024, 025	026- 029, 030	031- 034, 035	036- 039, 040
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	n, e, s, w, soil	n, e, s, w, soil
Notes	apvrs01 - erag pla - cyno dac grassland	apvrs02 - erag pla - plant spp	apvrs03 - erag pla - acac kar shrublaand	apvrs04 - erag pla - felimur	apvrs05 - chert outcrop	apvrs06 - erag pla	apvrs07 - aris con grassland	apvrs08 - erag pla
Altitude (m):	1528	1525	1525	1524	1523	1523	1523	1522
Aspect (Bearing):	s		e	e	n	e	e	
Slope (%):	1	0	1	1	1	1	2	0
Terrain unit	Crest		Crest	Crest	Crest	Crest	Crest	
Local topography:								
Stratigraphy:								
Petrology:								
Lithology:								
Soil form	Mispah	Mispah	Mispah	Mispah	Mispah	Mispah	Mispah	Hutton
Termitaria present	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Cover: Gravel -	0	0	0	0	20	0	0	0
Cover: Small stones -	0	0	0	0	10	0	0	0
Cover: Medium stones -	0	0	0	0	0	0	0	0
Cover: Large stones -	0	0	0	0	5	0	0	0

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Plot no	1	2	3	4	5	6	7	8
Rock:	0	0	0	0	5	0	0	0
Soil depth (mm):	160	250	200	250	250	100	200	1200
Erosion categories								
Surface crusting:	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Estimate % Clay (A-horizon):	17	17	17	17	17	17	17	17
Cover total (%):	50	45	35	35	45	35	65	55
Cover tree layer (%):	0	0	0	0	0	0	0	0
Cover shrub layer (%):	0	0	0	0	0	0	0	0
Cover herb layer (%):	50	45	35	35	45	35	65	55
Cover grass layer (%):	30	30	10	20	35	25	55	35
Cover forbs layer (%):	20	15	25	15	10	10	10	10
Cover open water (%):	0	0	0	0	0	0	0	0
Cover bare rock (%):	0	0	0	0	0	0	0	0
Height (highest) trees (m):	0	0	0	0	0	0	0	0
Height lowest trees (m):	0	0	0	0	0	0	0	0
Height (highest) shrubs (m):	0	0	0	0	0	0	0	0
Height lowest shrubs (m):	0	0	0	0	0	0	0	0
Aver height (high) herbs (cm):	5	5	3	2.5	5	5	5	5
Aver height lowest herbs (cm):	2.5	2.5	1	1	2.5	2.5	2.5	2
Maximum height herbs (cm):	50	25	5	20	100	25	20	10
Maximum height cryptogams (mm):	0	0	0	0	0	0	0	0

APPENDIX B – SURVEY DATA: VEGETATION LIST

Database/ releve no	301	302	303	304	305	306	307	308
Species/ Plot no	1	2	3	4	5	6	7	8
Acacia karroo			+					1
Alternanthera pungens	+		+		+		+	
Aristida congesta							1	
Bidens pilosa		+						
Brachiaria serrata							+	
Campuloclinium macrocephalum					+			
Conyza podocephala			+					
Crassula lanceolata subsp. lanceolata					+			
Crepis hypochaeridea		+		+				
Cucumis zeyheri					+			
Cynodon dactylon	+					+		+
Digitaria eriantha					+			
Diheteropogon amplexans					+			
Eragrostis chloromelas		+						
Eragrostis curvula				+	+			
Eragrostis plana	3	+	+	1		+	+	+
Felicia muricata subsp. muricata	+	+	2a	1	+	+		
Helichrysum rugulosum				+				
Melinis repens subsp. repens		+			+	+	+	
Nidorella hottentotica				+	+	+		
Parinari capensis					+		+	
Plantago species (208_1536)	+	+		+	+	+		+
Protasparagus setaceus					+			
Rhus lancea		+						
Richardia brasiliensis	+		+					
Scabiosa columbaria							+	
Schkuhria pinnata					+			
Sporobolus africanus			+					
Tagetes minuta		+						
Themeda triandra					+			
Urochloa mosambicensis			+					
Verbena brasiliensis					+			
Vernonia oligocephala			+					

APPENDIX C – GEOREFERENCED DIGITAL PHOTOGRAPHS TAKEN PER SURVEY PLOT



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 1st of June 2018

Associated ecosystem	Terrestrial	Aquatic (Riparian fringe and/ or wetlands)	
Botanical Name	Carletonville Dolomite \Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
Acalypha angustata	1		1
Alloteropsis semialata subsp. semialata	1		1
Andropogon schirensis	1		1
Anthospermum rigidum subsp. pumilum	1		1
Aristida canescens subsp. canescens	1		1
Aristida congesta subsp. congesta	1		1
Aristida diffusa subsp. diffusa	1		1
Barleria macrostegia	1		1
Bewsia biflora	1		1
Boophone disticha	1		1
Brachiaria serrata	1		1
Bulbostylis burchellii	1		1
Chamaecrista mimosoides	1		1
Chamaesyce inaequilatera	1		1
Crabbea angustifolia	1		1
Cymbopogon excavatus	1		1
Cymbopogon pospischilii	1		1
Cynodon dactylon	1		1
Delosperma davyi	1		1
Dianthus mooiensis subsp. mooiensis var. mooiensis	1		1
Dicoma anomala subsp. anomala	1		1
Digitaria tricholaenoides	1		1
Diheteropogon amplexans var. amplexans	1		1
Elephantorrhiza elephantina	1		1
Elionurus muticus	1		1
Eragrostis chloromelas	1		1
Eragrostis curvula	1		1
Eragrostis gummiflua	1		1
Eragrostis plana	1	1	2
Eragrostis racemosa	1		1
Eustachys paspaloides	1		1
Habenaria mossii	1		1
Helichrysum caespititium	1		1
Helichrysum miconiifolium	1		1
Helichrysum nudifolium var. nudifolium	1		1
Heteropogon contortus	1		1
Hyparrhenia hirta	1		1
Indigofera comosa	1		1

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Associated ecosystem	Terrestrial	Aquatic (Riparian fringe and/ or wetlands)	
Botanical Name	Carletonville Dolomite \Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
Ipomoea ommaneyi	1		1
Justicia anagalloides	1		1
Kohautia amatymbica	1		1
Kyphocarpa angustifolia	1		1
Loudetia simplex	1		1
Melinis nerviglumis	1		1
Melinis repens subsp. repens	1		1
Monocymbium cerasiiforme	1		1
Ophrestia oblongifolia var. oblongifolia	1		1
Panicum coloratum var. coloratum	1		1
Parinari capensis subsp. capensis	1		1
Pogonarthria squarrosa	1		1
Pollichia campestris	1		1
Pygmaeothamnus zeyheri var. rogersii	1		1
Rhus magalismontana subsp. magalismontana	1		1
Schizachyrium sanguineum	1		1
Senecio coronatus	1		1
Setaria sphacelata var. sphacelata	1	1	2
Themeda triandra	1		1
Trichoneura grandiglumis	1		1
Triraphis andropogonoides	1		1
Tristachya leucothrix	1		1
Tristachya rehmannii	1		1
Tylosema esculentum	1		1
Vernonia oligocephala	1		1
Ziziphus zeyheriana	1		1
Agrostis lachnantha var. lachnantha		1	1
Andropogon appendiculatus		1	1
Andropogon eucomus		1	1
Aponogeton junceus		1	1
Aristida aequiglumis		1	1
Ascolepis capensis		1	1
Berkheya radula		1	1
Berkheya speciosa subsp. speciosa		1	1
Berula erecta subsp. erecta		1	1
Carex acutiformis		1	1
Carex austro-africana		1	1
Carex schlechteri		1	1
Centella asiatica		1	1
Centella coriacea		1	1
Ceratophyllum demersum var. demersum		1	1
Chironia palustris subsp. palustris		1	1

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Associated ecosystem	Terrestrial	Aquatic (Riparian fringe and/ or wetlands)	
Botanical Name	Carletonville Dolomite \Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
Cordylogyne globosa		1	1
Crassula tuberella		1	1
Crinum bulbispermum		1	1
Cyperus congestus		1	1
Cyperus cyperoides subsp. cyperoides		1	1
Cyperus distans		1	1
Cyperus immensus		1	1
Cyperus longus var. longus		1	1
Cyperus marginatus		1	1
Disa zuluensis		1	1
Echinochloa holubii		1	1
Equisetum ramosissimum subsp. ramosissimum		1	1
Eragrostis micrantha		1	1
Eragrostis planiculmis		1	1
Falkia oblonga		1	1
Ficinia acuminata		1	1
Fimbristylis complanata		1	1
Fimbristylis ferruginea		1	1
Fuirena pubescens var. pubescens		1	1
Gladiolus papilio		1	1
Haplocarpha lyrata		1	1
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

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Associated ecosystem	Terrestrial	Aquatic (Riparian fringe and/ or wetlands)	
Botanical Name	Carletonville Dolomite \Grassland	Eastern Temperate Freshwater Wetlands	Grand Total
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
Pycnus macranthus		1	1
Pycnus nitidus		1	1
Ranunculus multifidus		1	1
Rorippa fluviatilis var. caledonica		1	1
Rorippa fluviatilis var. fluviatilis		1	1
Rumex lanceolatus		1	1
Satyrion hallackii subsp. hallackii		1	1
Schoenoplectus corymbosus		1	1
Schoenoplectus decipiens		1	1
Scleria dieterlenii		1	1
Senecio inornatus		1	1
Senecio microglossus		1	1
Setaria pallide-fusca		1	1
Sium repandum		1	1
Thelypteris confluens		1	1
Typha capensis		1	1
Utricularia inflexa		1	1
Wahlenbergia banksiana		1	1
Xyris gerrardii		1	1
Grand Total	64	100	164