7 DESCRIPTION OF THE BASELINE ENVIRONMENT

7.1 Introduction

According to section 28(e) of the NEMA Regulations, this section includes a description of the baseline environment that may be affected by the activity and the manner in which the biophysical, social, economic and cultural aspects of the environment may be affected by the proposed activity.

7.2 Study Area in Regional Context

7.2.1 Locality

The study area falls within the Limpopo Province between the Tabor Substation located just south of the Capricorn Toll Plaza approximately 67km north of Polokwane to the proposed new Bokmakirie (Nzhelele) substation approximately 45km south of Musina.

The regional location of the proposed project is indicated in **Figure 7.1**.

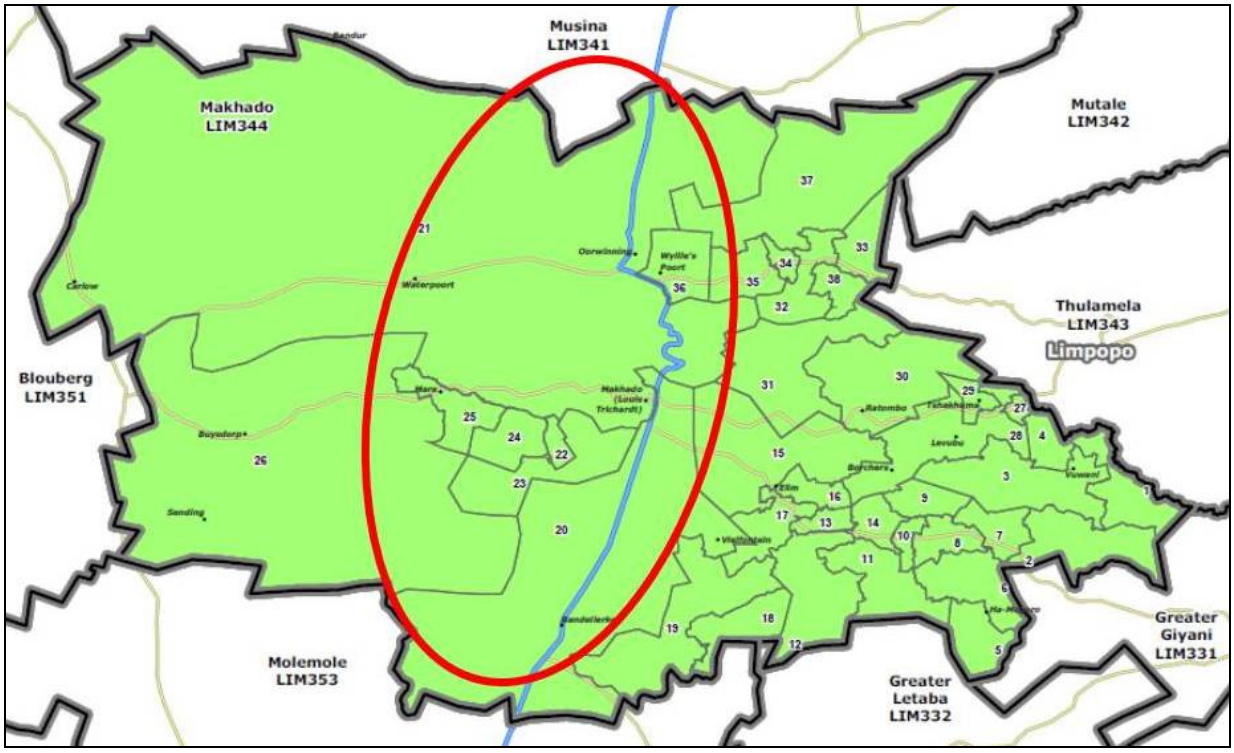


Figure 7.1: The location of the study area within the Makhado Local Municipality

7.2.2 Study Area

Due to the fact that the EIA is a linear development, the Tabor- Nzhelele 400 kV power line EIA study area is a shown as a sphere starting and ending at the two specified substation (**Figure 7.1**). The study area is approximately 83 kilometres in length and

includes a total of 94 different farms divided into 204 farm portions along the length of the various alternative alignments. A list of the farm portions are included in **Table 7.1**. **Figure 7.2** shows the location of the proposed alternative alignments within the demarcated study area.

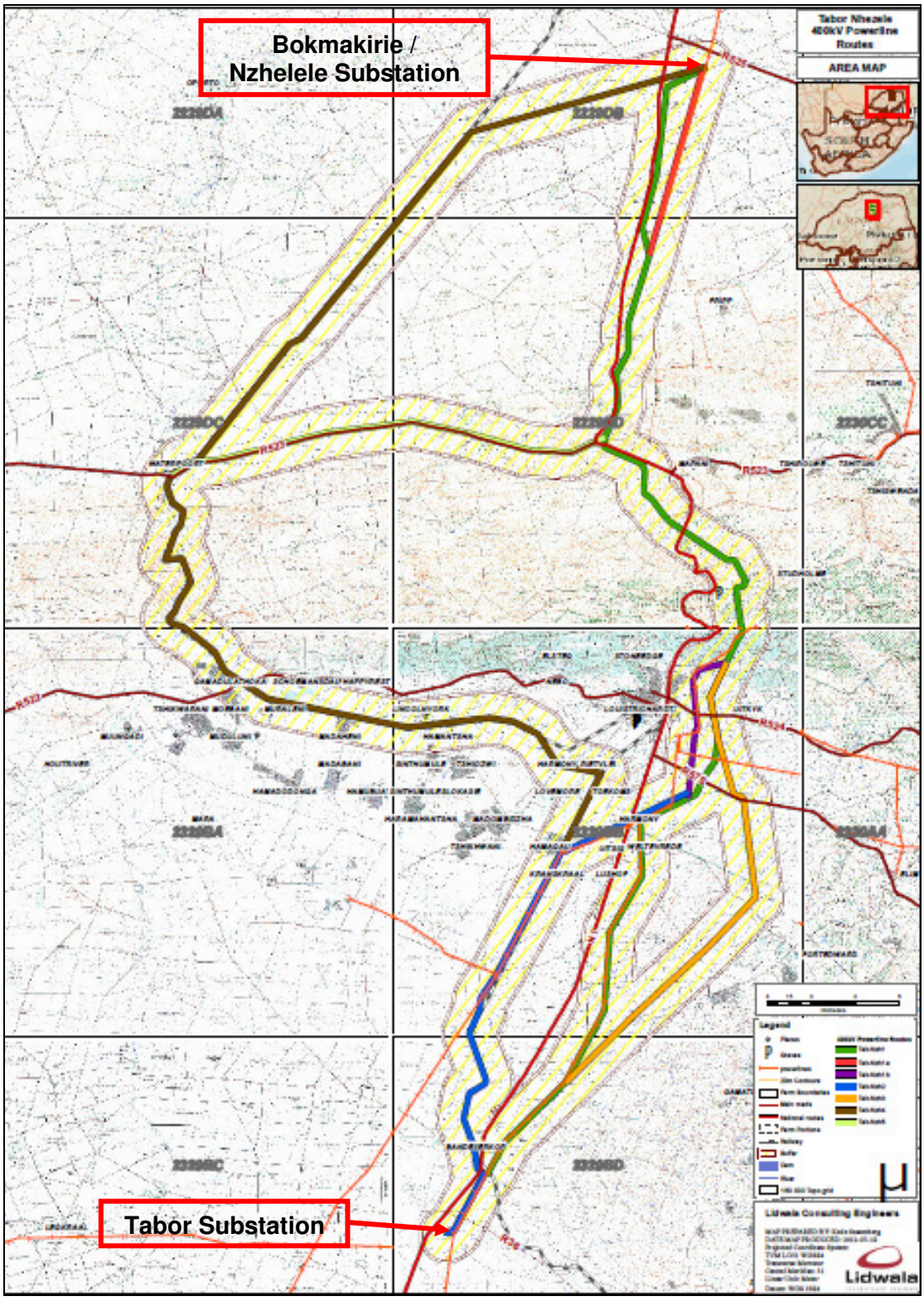


Figure 7.2: Proposed Alternative Alignments within the Study Area

Table 7.1: Farm Portions situated within the Tabor – Nzhelele 400 kV powerline Study Area

ALT	SG_CODE	FARM_NO	PORTION	FARM NAME
Tab-Nzh1	T0MS00000000070100000	701	R	WOODLANDS 701 MS
Tab-Nzh1	T0LS00000000038100002	381	2	381 LS
Tab-Nzh1	T0LS00000000039100001	391	1	391 LS
Tab-Nzh1	T0LS00000000031900000	319	R	BANKOP 319 LS
Tab-Nzh1	T0MS00000000065000000	650	R	BEKAF 650 MS
Tab-Nzh1	T0LS00000000037900000	379	R	BESCHUITKUIL 379 LS
Tab-Nzh1	T0MS00000000057500000	575	R	BUXTON 575 MS
Tab-Nzh1	T0MS00000000080000002	800	2	CLYDESDALE 800 MS
Tab-Nzh1	T0MS00000000080000004	800	4	CLYDESDALE 800 MS
Tab-Nzh1	T0MS00000000080000006	800	6	CLYDESDALE 800 MS
Tab-Nzh1	T0LS00000000041700000	417	R	DRIEKLOOF 417 LS
Tab-Nzh1	T0MS00000000077000000	770	R	FENTON 770 MS
Tab-Nzh1	T0MS00000000072600000	726	R	FRANZHOEK 726 MS
Tab-Nzh1	T0LS00000000028200002	282	2	GROBLERSPLAATS 282 LS
Tab-Nzh1	T0MS00000000058100001	581	1	GROOT ENDABA 581 MS
Tab-Nzh1	T0MS00000000074100000	741	R	JACK BROWN 741 MS
Tab-Nzh1	T0LS00000000047300000	473	R	JOPPA 473 LS
Tab-Nzh1	T0MS00000000064700000	647	R	JULIANA 647 MS
Tab-Nzh1	T0LS00000000041500000	415	R	KAMEELKUIL 415 LS
Tab-Nzh1	T0LS00000000041500001	415	1	KAMEELKUIL 415 LS
Tab-Nzh1	T0LS00000000041400000	414	R	LANGGEDACHT 414 LS
Tab-Nzh1	T0LS00000000031300000	313	R	MAMPAKUIL 313 LS
Tab-Nzh1	T0LS00000000031300001	313	1	MAMPAKUIL 313 LS
Tab-Nzh1	T0MS00000000073200000	732	R	MARIUS 732 MS
Tab-Nzh1	T0MS00000000071400000	714	R	MASEQUA 714 MS
Tab-Nzh1	T0LS00000000031400000	314	R	MELKHOUTKOPJES 314 LS
Tab-Nzh1	T0MS00000000072800000	728	R	MOOIPLAATS 728 MS
Tab-Nzh1	T0LS00000000028000001	280	1	MOW COP 280 LS
Tab-Nzh1	T0LS00000000028000002	280	2	MOW COP 280 LS
Tab-Nzh1	T0LS00000000028000000	280	R	MOW COP 280 LS
Tab-Nzh1	T0LS00000000031800006	318	6	OOG VAN DOORNRIVIER 318 LS
Tab-Nzh1	T0LS00000000031800009	318	9	OOG VAN DOORNRIVIER 318 LS
Tab-Nzh1	T0LS00000000031800004	318	4	OOG VAN DOORNRIVIER 318 LS
Tab-Nzh1	T0LS00000000031800005	318	5	OOG VAN DOORNRIVIER 318 LS
Tab-Nzh1	T0LS00000000031800008	318	8	OOG VAN DOORNRIVIER 318 LS
Tab-Nzh1	T0MS00000000058600000	586	R	OOM JAN 586 MS
Tab-Nzh1	T0MS00000000071300000	713	R	OVERWINNING 713 MS
Tab-Nzh1	T0MS00000000063700000	637	R	RISSIK 637 MS
Tab-Nzh1	T0MS00000000056700000	567	R	SCOTT 567 MS
Tab-Nzh1	T0MS00000000080700000	807	R	SUNNYSIDE 807 MS
Tab-Nzh1	T0MS00000000080600000	806	R	VLAKFONTEIN 806 MS
Tab-Nzh1	T0LS00000000028500047	285	47	VONDELING 285
Tab-Nzh1	T0LS00000000028500018	285	18	VONDELING 285

ALT	SG_CODE	FARM_NO	PORTION	FARM NAME
Tab-Nzh1	T0LS00000000028500026	285	26	VONDELING 285
Tab-Nzh1	T0LS00000000028500010	285	10	VONDELING 285
Tab-Nzh1	T0LS00000000028500012	285	12	VONDELING 285
Tab-Nzh1	T0LS00000000028500030	285	30	VONDELING 285
Tab-Nzh1	T0LS00000000028500000	285	R	VONDELING 285
Tab-Nzh1	T0LS00000000028500001	285	1	VONDELING 285
Tab-Nzh1	T0LS00000000028500002	285	2	VONDELING 285
Tab-Nzh1	T0LS00000000028500037	285	37	VONDELING 285
Tab-Nzh1	T0LS00000000028500042	285	42	VONDELING 285
Tab-Nzh1	T0LS00000000028500045	285	45	VONDELING 285
Tab-Nzh1	T0LS00000000028500000	285	R	VONDELING 285
Tab-Nzh1	T0LS00000000028500070	285	70	VONDELING 285 LS
Tab-Nzh1	T0LS00000000028500071	285	71	VONDELING 285 LS
Tab-Nzh1	T0LS00000000041800000	418	R	VRYHEID 418 LS
Tab-Nzh1	T0LS00000000028600000	286	R	VYGEBOOMSPRUIT 286 LS
Tab-Nzh1	T0MS00000000072700001	727	1	WALLACE DALE 727 MS
Tab-Nzh1	T0MS00000000072700000	727	R	WALLACE DALE 727 MS
Tab-Nzh1	T0LS00000000040100000	401	R	WATER PAN 401 LS
Tab-Nzh1	T0MS00000000064900000	649	R	WINDHOEK 649 MS
Tab-Nzh1a	T0MS00000000057500000	575	R	BUXTON 575 MS
Tab-Nzh1a	T0MS00000000057800000	578	R	FANIE 578 MS
Tab-Nzh1a	T0MS00000000058100001	581	1	GROOT ENDABA 581 MS
Tab-Nzh1a	T0MS00000000064700000	647	R	JULIANA 647 MS
Tab-Nzh1a	T0MS00000000058600000	586	R	OOM JAN 586 MS
Tab-Nzh1a	T0MS00000000057400000	574	R	PHANTOM 640
Tab-Nzh1a	T0MS00000000063700000	637	R	RISSIK 637 MS
Tab-Nzh1a	T0MS00000000056700000	567	R	SCOTT 567 MS
Tab-Nzh1b	T0LS00000000028800007	288	7	BERGVLIET 288 LS
Tab-Nzh1b	T0LS00000000028000001	280	1	MOW COP 280 LS
Tab-Nzh1b	T0LS00000000028700034	287	34	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700003	287	3	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700008	287	8	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700014	287	14	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700019	287	19	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700033	287	33	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700034	287	34	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028700040	287	40	RONDEBOSCH 287
Tab-Nzh1b	T0LS00000000028500020	285	20	VONDELING 285
Tab-Nzh1b	T0LS00000000028500006	285	6	VONDELING 285
Tab-Nzh1b	T0LS00000000028500044	285	44	VONDELING 285
Tab-Nzh1b	T0LS00000000028600000	286	R	VYGEBOOMSPRUIT 286 LS
Tab-Nzh2	T0LS00000000029100000	291	R	291 LS
Tab-Nzh2	T0LS00000000041600000	416	R	BANDELIERKOP 416 LS
Tab-Nzh2	T0LS00000000032000003	320	3	BRAKSPRIUT 320 LS
Tab-Nzh2	T0LS00000000032000022	320	22	BRAKSPRIUT 320 LS

ALT	SG_CODE	FARM_NO	PORTION	FARM NAME
Tab-Nzh2	T0LS00000000031200001	312	1	GAAROSKRAAL 312 LS
Tab-Nzh2	T0LS00000000031200003	312	3	GAAROSKRAAL 312 LS
Tab-Nzh2	T0LS00000000047300000	473	R	JOPPA 473 LS
Tab-Nzh2	T0LS00000000028900002	289	2	LEDIG 289 LS
Tab-Nzh2	T0LS00000000028700034	287	34	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700048	287	48	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700049	287	49	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700060	287	60	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700061	287	61	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700084	287	84	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700085	287	85	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700050	287	50	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700052	287	52	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700058	287	58	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700059	287	59	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000028700062	287	62	RONDEBOSCH 287
Tab-Nzh2	T0LS00000000032200000	322	R	TWEEPUTKOPPIES 322 LS
Tab-Nzh2	T0LS00000000032200001	322	1	TWEEPUTKOPPIES 322 LS
Tab-Nzh2	T0LS00000000041800000	418	R	VRYHEID 418 LS
Tab-Nzh2	T0LS00000000037200001	372	1	WAAGKRAAL 372 LS
Tab-Nzh2	T0LS00000000037200002	372	2	WAAGKRAAL 372 LS
Tab-Nzh2	T0LS00000000037300000	373	R	WEGKRUIP 373 LS
Tab-Nzh2	T0LS00000000037300004	373	4	WEGKRUIP 373 LS
Tab-Nzh2	T0LS00000000037400000	374	R	ZONDERWATER 374 LS
Tab-Nzh3	T0LT00000000004200012	42	12	BALLYMORE 42 LT
Tab-Nzh3	T0LT00000000004200010	42	10	BALLYMORE 42 LT
Tab-Nzh3	T0LS00000000031900000	319	R	BANKOP 319 LS
Tab-Nzh3	T0LS00000000031500013	315	13	BOSCHKOPJE 315 LS
Tab-Nzh3	T0LS00000000031500001	315	1	BOSCHKOPJE 315 LS
Tab-Nzh3	T0LS00000000041700000	417	R	DRIEKLOOF 417 LS
Tab-Nzh3	T0LS00000000028400000	284	R	ELANDSPRUIT 284 LS
Tab-Nzh3	T0LS00000000028400001	284	1	ELANDSPRUIT 284 LS
Tab-Nzh3	T0LS00000000028000000	280	R	MOW COP 280 LS
Tab-Nzh3	T0LS00000000028000001	280	1	MOW COP 280 LS
Tab-Nzh3	T0LS00000000032600000	326	R	VALDIGLEN 326 LS
Tab-Nzh3	T0LS00000000028500037	285	37	VONDELING 285
Tab-Nzh3	T0LS00000000028500062	285	62	VONDELING 285
Tab-Nzh3	T0LS00000000028500047	285	47	VONDELING 285
Tab-Nzh3	T0LS00000000028500018	285	18	VONDELING 285
Tab-Nzh3	T0LS00000000028500026	285	26	VONDELING 285
Tab-Nzh3	T0LS00000000028500012	285	12	VONDELING 285
Tab-Nzh3	T0LS00000000028500030	285	30	VONDELING 285
Tab-Nzh3	T0LS00000000028500000	285	R	VONDELING 285
Tab-Nzh3	T0LS00000000028500001	285	1	VONDELING 285
Tab-Nzh3	T0LS00000000028500002	285	2	VONDELING 285

ALT	SG_CODE	FARM_NO	PORTION	FARM NAME
Tab-Nzh3	T0LS00000000028500003	285	3	VONDELING 285
Tab-Nzh3	T0LS00000000028500037	285	37	VONDELING 285
Tab-Nzh3	T0LS00000000028500042	285	42	VONDELING 285
Tab-Nzh3	T0LS00000000028500045	285	45	VONDELING 285
Tab-Nzh3	T0LS00000000028500003	285	3	VONDELING 285
Tab-Nzh3	T0LS00000000028500047	285	47	VONDELING 285
Tab-Nzh3	T0LS00000000028500000	285	R	VONDELING 285
Tab-Nzh3	T0LS00000000028500070	285	70	VONDELING 285 LS
Tab-Nzh3	T0LS00000000028500071	285	71	VONDELING 285 LS
Tab-Nzh3	T0LS00000000028600002	286	2	VYGEBOOMSPRUIT 286 LS
Tab-Nzh3	T0LS00000000028600001	286	1	VYGEBOOMSPRUIT 286 LS
Tab-Nzh3	T0LS00000000028600002	286	2	VYGEBOOMSPRUIT 286 LS
Tab-Nzh3	T0LS00000000040100000	401	R	WATER PAN 401 LS
Tab-Nzh4	T0LS00000000022500000	225	R	225 LS
Tab-Nzh4	T0LS00000000029100000	291	R	291 LS
Tab-Nzh4	T0MS00000000060800000	608	R	AFSTAP 608 MS
Tab-Nzh4	T0MS00000000071200001	712	1	BERGWATER 712 MS
Tab-Nzh4	T0MS00000000076000001	760	1	BRISTOL 760 MS
Tab-Nzh4	T0MS00000000059800000	598	R	BRUILOF 598 MS
Tab-Nzh4	T0MS00000000057500000	575	R	BUXTON 575 MS
Tab-Nzh4	T0LS00000000021300000	213	R	CHELFORD 213 LS
Tab-Nzh4	T0MS00000000060200001	602	1	CLAUDINA 602 MS
Tab-Nzh4	T0MS00000000069900002	699	2	CONISTON 699 MS
Tab-Nzh4	T0MS00000000074700000	747	R	CRIMEA 747 MS
Tab-Nzh4	T0MS00000000069600000	696	R	DORPS-RIVIER 696 MS
Tab-Nzh4	T0LS00000000025000000	250	R	DOWNTON 250 LS
Tab-Nzh4	T0MS00000000057400000	574	R	GROOT ENDABA 581
Tab-Nzh4	T0MS00000000058100001	581	1	GROOT ENDABA 581 MS
Tab-Nzh4	T0MS00000000056400000	564	R	GROOTPRAAT 564 MS
Tab-Nzh4	T0MS00000000061000000	610	R	HONEYMOON 610 MS
Tab-Nzh4	T0LS00000000022900000	229	R	INDIA 229 LS
Tab-Nzh4	T0MS00000000069200001	692	1	KLIPRIVIER 692 MS
Tab-Nzh4	T0MS00000000069200002	692	2	KLIPRIVIER 692 MS
Tab-Nzh4	T0MS00000000069200007	692	7	KLIPRIVIER 692 MS
Tab-Nzh4	T0MS00000000066400000	664	R	KOODOOBULT 664 MS
Tab-Nzh4	T0MS00000000076100000	761	R	LADISMIT 761 MS
Tab-Nzh4	T0LS00000000024800000	248	R	LANGFORD 248 LS
Tab-Nzh4	T0LS00000000117200000	1172	R	LEDIG 1172 LS
Tab-Nzh4	T0LS00000000028900002	289	2	LEDIG 289 LS
Tab-Nzh4	T0LS00000000028900012	289	12	LEDIG 289 LS
Tab-Nzh4	T0LS00000000028900008	289	8	LEDIG 289 LS
Tab-Nzh4	T0LS00000000029000000	290	R	NOOITGEDACHT 290 LS
Tab-Nzh4	T0MS00000000075800000	758	R	PRINCE 758 MS
Tab-Nzh4	T0MS00000000059300000	593	R	PYLKOP 593 MS
Tab-Nzh4	T0MS00000000059300001	593	1	PYLKOP 593 MS

ALT	SG_CODE	FARM_NO	PORTION	FARM NAME
Tab-Nzh4	T0MS00000000059500000	595	R	PYLKOP SIDING 595 MS
Tab-Nzh4	T0LS00000000024000000	240	R	RAMPIAN 240 LS
Tab-Nzh4	T0MS00000000074800000	748	R	ROBERTSON 748 MS
Tab-Nzh4	T0MS00000000059000000	590	R	SOMERVILLE 590 MS
Tab-Nzh4	T0MS00000000061100000	611	R	SOMME 611 MS
Tab-Nzh4	T0LS00000000024900000	249	R	SPRUITHOEK 249 LS
Tab-Nzh4	T0MS00000000056500000	565	R	STEENBOK 565 MS
Tab-Nzh4	T0MS00000000066300000	663	R	SUNNYLAND 663 MS
Tab-Nzh4	T0MS00000000060100000	601	R	TOBY 601 MS
Tab-Nzh4	T0MS00000000058900000	589	R	VRIENDEN 589 MS
Tab-Nzh4	T0MS00000000069500005	695	5	WATERPOORT 695 MS
Tab-Nzh4	T0MS00000000069500006	695	6	WATERPOORT 695 MS
Tab-Nzh4	T0MS00000000069500007	695	7	WATERPOORT 695 MS
Tab-Nzh4	T0MS00000000069500009	695	9	WATERPOORT 695 MS
Tab-Nzh5	T0MS00000000070200000	702	R	BUSHY RISE 702 MS
Tab-Nzh5	T0MS00000000069900003	699	3	CONISTON 699 MS
Tab-Nzh5	T0MS00000000069200000	692	R	KLIPRIVIER 692 MS
Tab-Nzh5	T0MS00000000065700000	657	R	KOSCHADE 657 MS
Tab-Nzh5	T0MS00000000065900000	659	R	MALAPCHANI 659 MS
Tab-Nzh5	T0MS00000000070600000	706	R	MOUNTAIN VIEW 706 MS
Tab-Nzh5	T0MS00000000065400000	654	R	M'TAMBA VLEI 654 MS
Tab-Nzh5	T0MS00000000070400000	704	R	PRINCE'S HILL 704 MS
Tab-Nzh5	T0MS00000000065500000	655	R	QUALIPAN 655 MS
Tab-Nzh5	T0MS00000000065300000	653	R	SULPHUR SPRINGS 653 MS
Tab-Nzh5	T0MS00000000069300000	693	R	SUTHERLAND 693 MS
Tab-Nzh5	T0MS00000000064900000	649	R	WINDHOEK 649 MS
Tab-Nzh5	T0MS00000000070100000	701	R	WOODLANDS 701 MS

7.3 Description of the Baseline Environment

7.3.1 Topography

The terrain morphology of the study area is broadly described as slightly undulating to strong undulating plains with high mountains. The study area (90 x 40 km) is divided into three zones, each of which presents different topographical characteristics, i.e. a **northern section**, the **Soupansberg**, and a **southern section**. These are further described as follows:

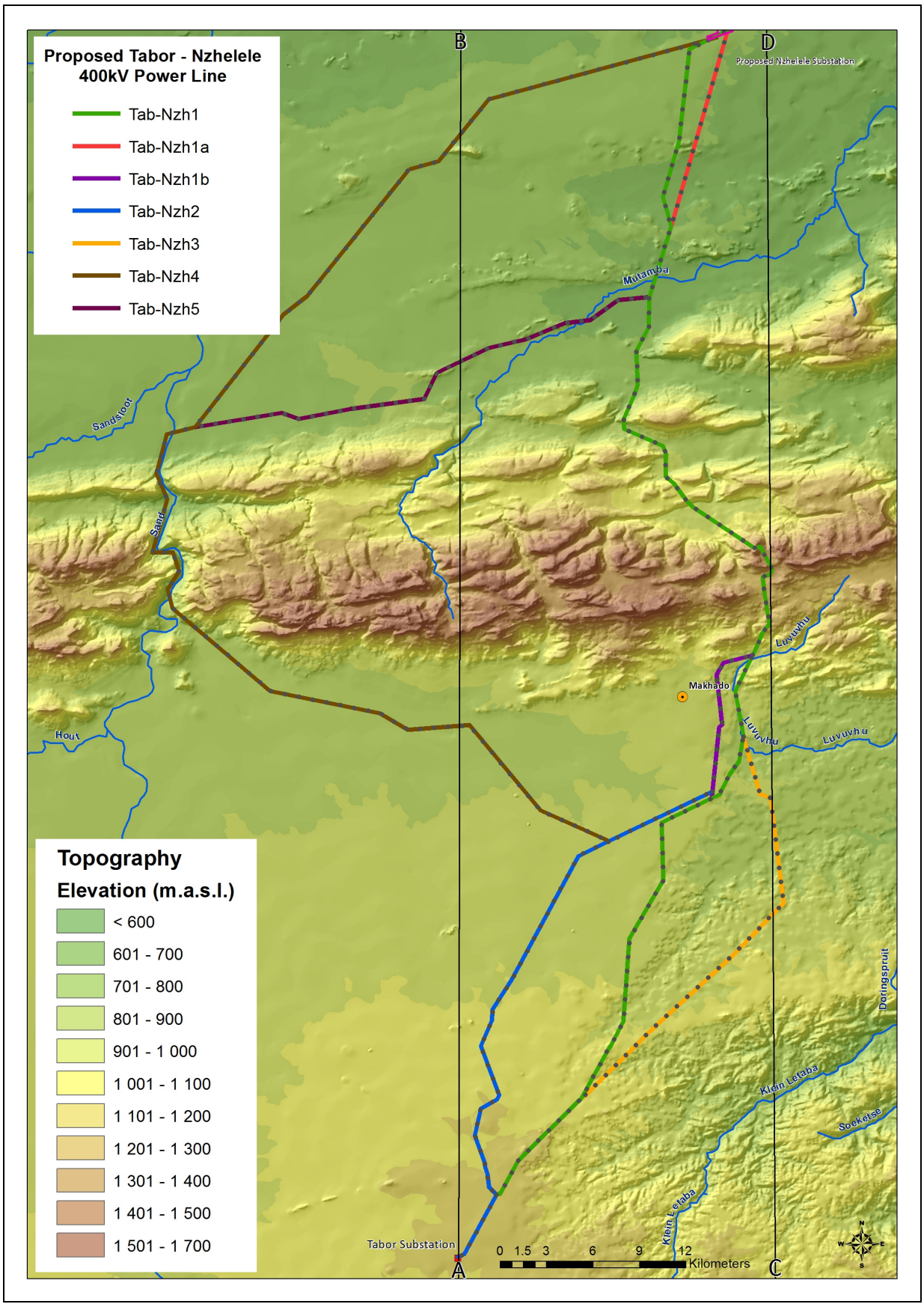


Figure 7.3: Topography depicted by means of a shaded relief map.

- **Northern Section**

This section lies north of the Soutpansberg and can be described as a Lowland with hills, The slightly undulating plains gently slopes northward, with an elevation ranging from 680 m.a.s.l. in the north to 790 m.a.s.l. in the south. Apart from isolated rocky hills, that are characteristic of this region, slopes are generally not steeper than 3 degrees.

The Mutamba river is the only major river in this region. It originates in the Soutpansberg, flowing north, then turning east along the foot of the mountain. The river is mostly dry, thus regarded as a non-perennial river.

- **Central Section**

The Soutpansberg presents a sharp contrast with the surrounding plains. It rises 1000 m above the landscape, making it a distinct feature that is visible from far distances. Weather-resistant quartzite rocks give rise to a mountainous, wedge-shaped terrain. The series of folded rocks stretches some 25 km from north to south, creating ranges of valleys and crests, providing for splendour and beauty. Access through the area is gained by means of a mountain pass, with a set of two tunnels in the middle section of the mountain.

Figure 7.4: Cliffs and valleys of the Soutpansberg, with the Hendrik Verwoerd tunnel.

The geological history of this unique mountain range is summarised as follows:

> About 1 800 million years ago the Soutpansberg depositional basin was formed as an east-west trending asymmetrical rift or half-graben along the Palala Shear Belt. This belt formed between two major crustal blocks, e.g. the Kaapvaal craton in the south and the Limpopo Belt in the north. Deposition started with basaltic lavas and was followed by sedimentary rocks (syn-rift sequence). After an erosional period, pink massive quartzite was deposited (post-rift sequence) which covered a much larger area then the original rift. Until the deposition of the Karoo rocks the Soutpansberg rocks formed a flat featureless landscape.

> Only after sedimentation had ceased (about 150 millions years ago) was the area strongly block-faulted and then uniformly tilted to the north. During the last ± 60 million years erosion formed the landscape as we see it today. The pink resistant quartzite was instrumental in shaping the present morphology.[1]

Streams created from leaching ground water follow cracks of faults and erosion channels, feeding into the Mutamba river (flowing north and east) and the Luvuvhu river (flowing south and east). It is noted that a section of the proposed power line partly follows the Luvuvhu river channel.

- **Southern Section**

The southern section comprises the area south of the Soutpansberg, extending south towards Tabor Substation. It ranges in elevation between 900 m.a.s.l. in the north and 1100 m.a.s.l. in the south.

This region presents two terrain types, i.e. Slightly Undulating Plains (west of the N1) and Moderately Undulating Plains (east of the N1), with the latter becoming strongly undulated as erosion channels become more prominent. The difference in morphology is illustrated in the cross section graphs in **Figure 7.5 & 7.6** (refer to the map in **Figure 7.3** for positioning the cross section lines).

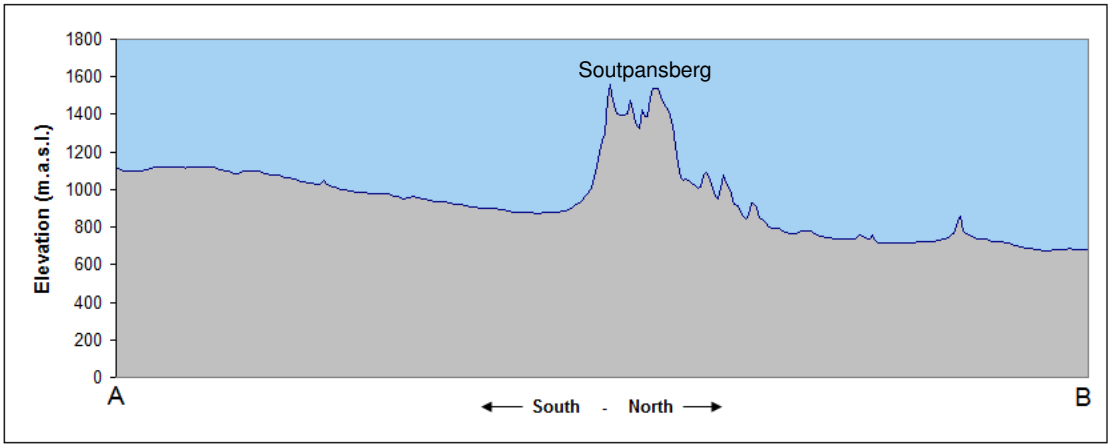


Figure 7.5: Cross section from north to south - western part of the study area

[1] BRANDL, G. Geology. *In* A First synthesis of the environmental, biological & cultural assets of the Soutpansberg. http://www.soutpansberg.com/workshop/synthesis/geology.htm. Accessed 16 May 2012.

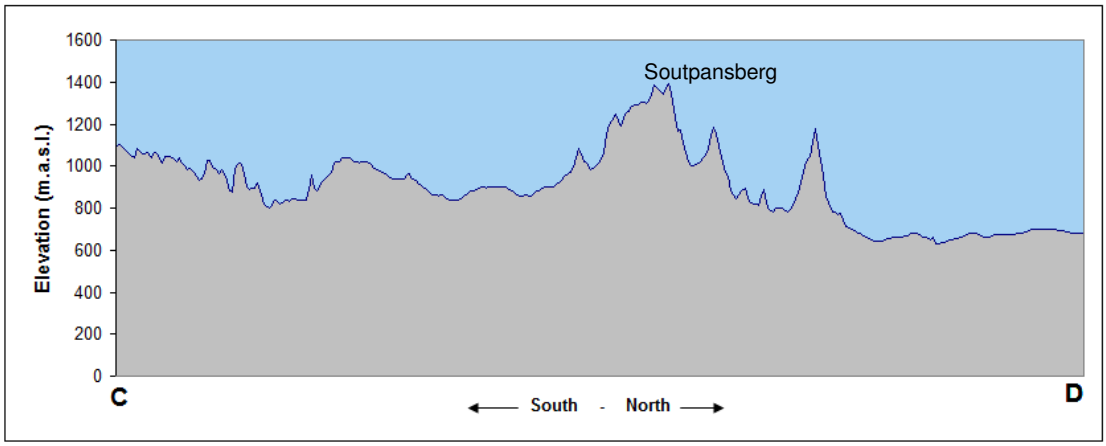


Figure 7.6: Cross section from north to south - eastern part of the study area.

Rivers are associated with the stronger undulating terrain. The main rivers in this region are the Luvuvhu and Khwali rivers.

7.3.2 Climate

The study area could be considered a subtropical climate. The winters are characterised by mild afternoons and cool evenings. Winters usually last from June to August. Summers experience warm and often humid temperatures with the occasional afternoon thunderstorm. Most of the rainfall occurs in the summer months, from November to March.

The following figures show yearly weather trends with information on monthly weather averages and extremes for Louis Trichardt and Musina, which fall in the middle and to the north of the study area respectively.

- **Temperature**

Figure 7.7 plots the average high and low temperature for each month of the year. It also shows the maximum and minimum recorded temperatures.

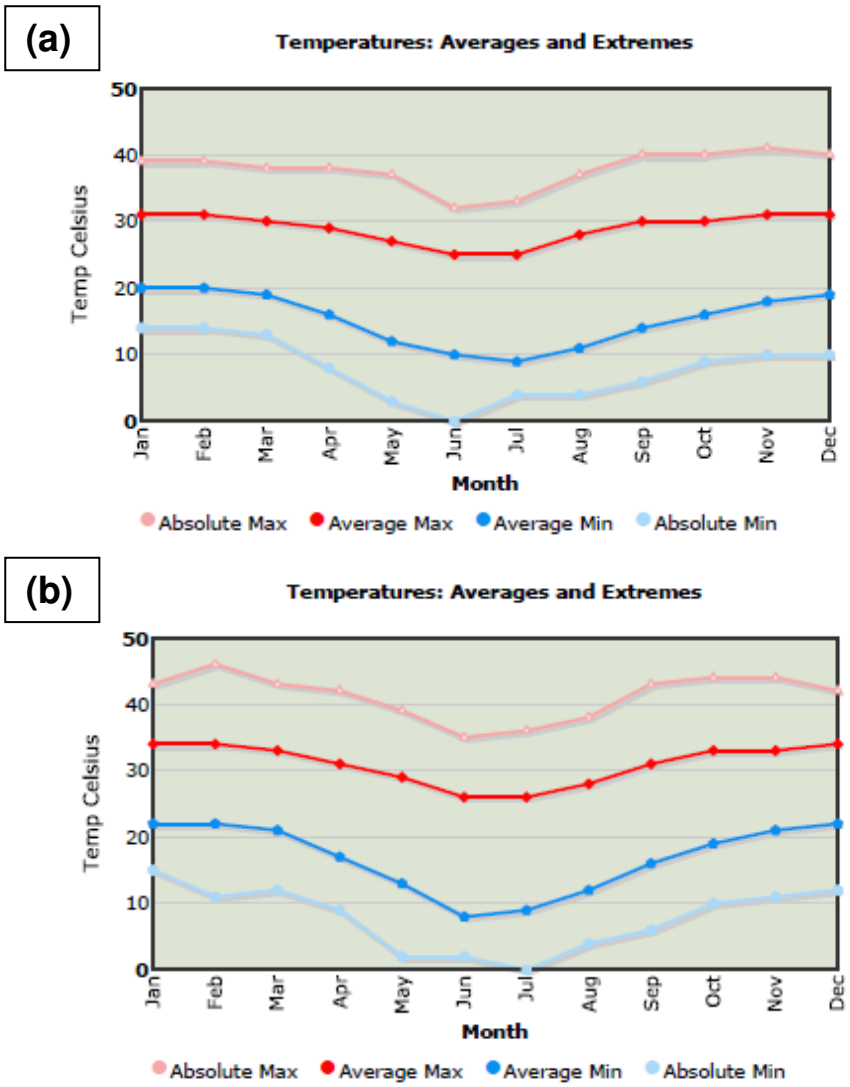


Figure 7.7: Average and Extreme Temperatures for Louis Trichardt **(a)** and Musina **(b)**

- **Precipitation Amount**

Figure 7.8 plots the average monthly precipitation amount

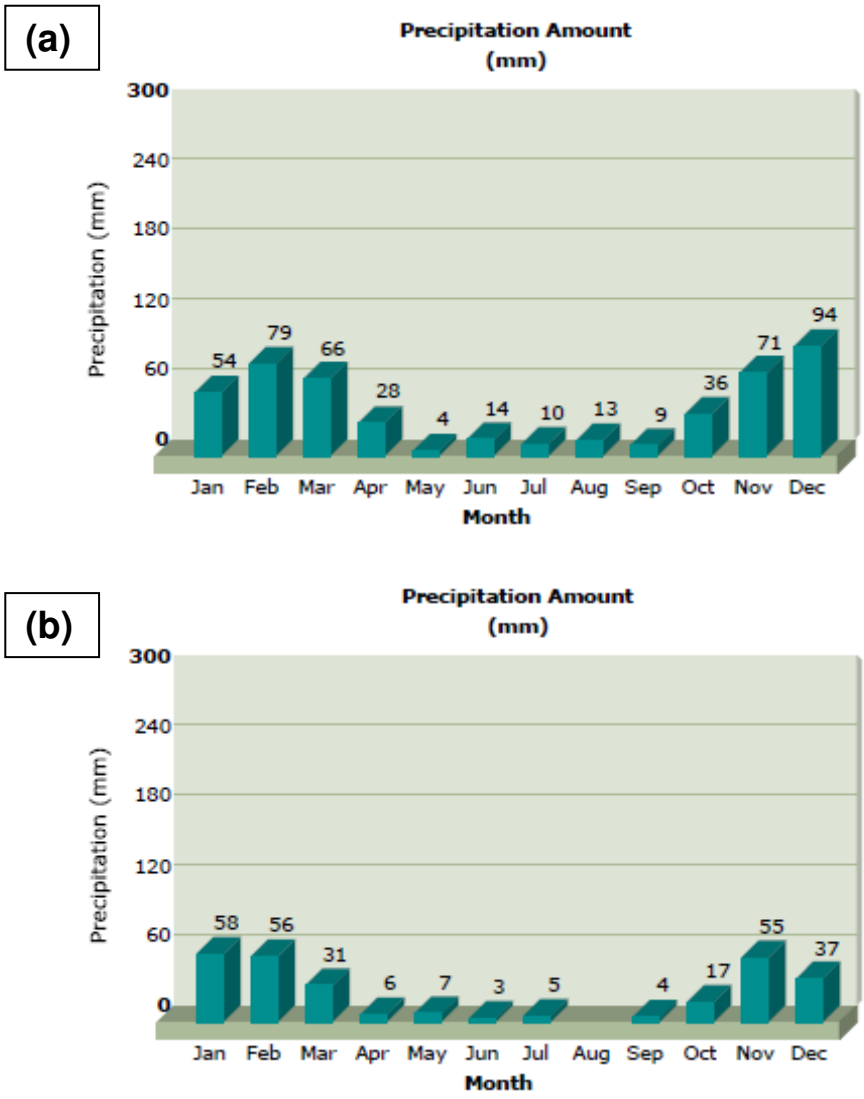


Figure 7.8: average precipitation for Louis Trichardt **(a)** and Musina **(b)**

Figure 7.9 shows a map of the long-term average rainfall patterns for the study area

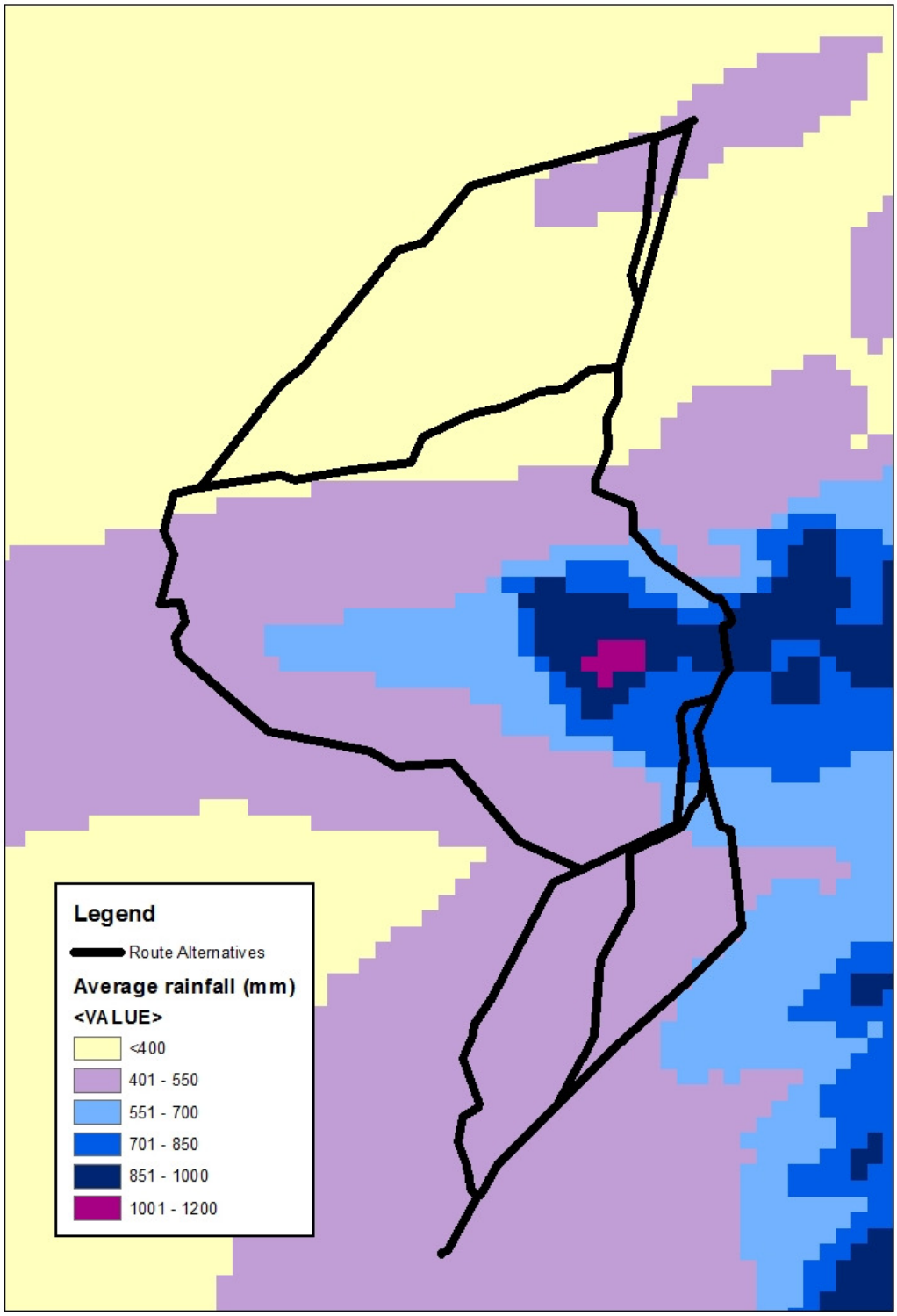


Figure 7.9: long-term average rainfall patterns for the study area

- **Rain days**

Figure 7.10 plots the average number of days in any month that you can expect to see rain falling.

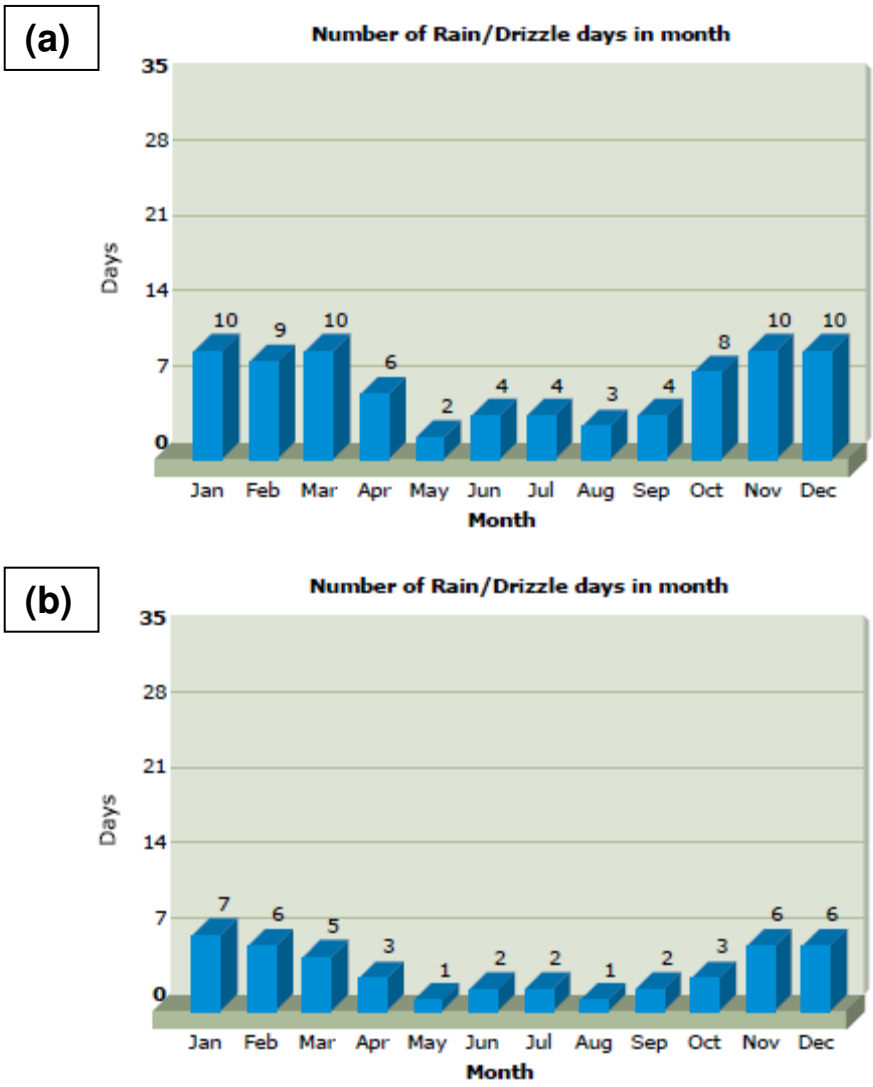


Figure 7.10: Average number of rain days per month for for Louis Trichardt **(a)** and Musina **(b)**

- **Wind Speed**

Figure 7.11 plots the average daily wind speed you can expect for any month. It also shows the maximum recorded sustained wind speed for each month.

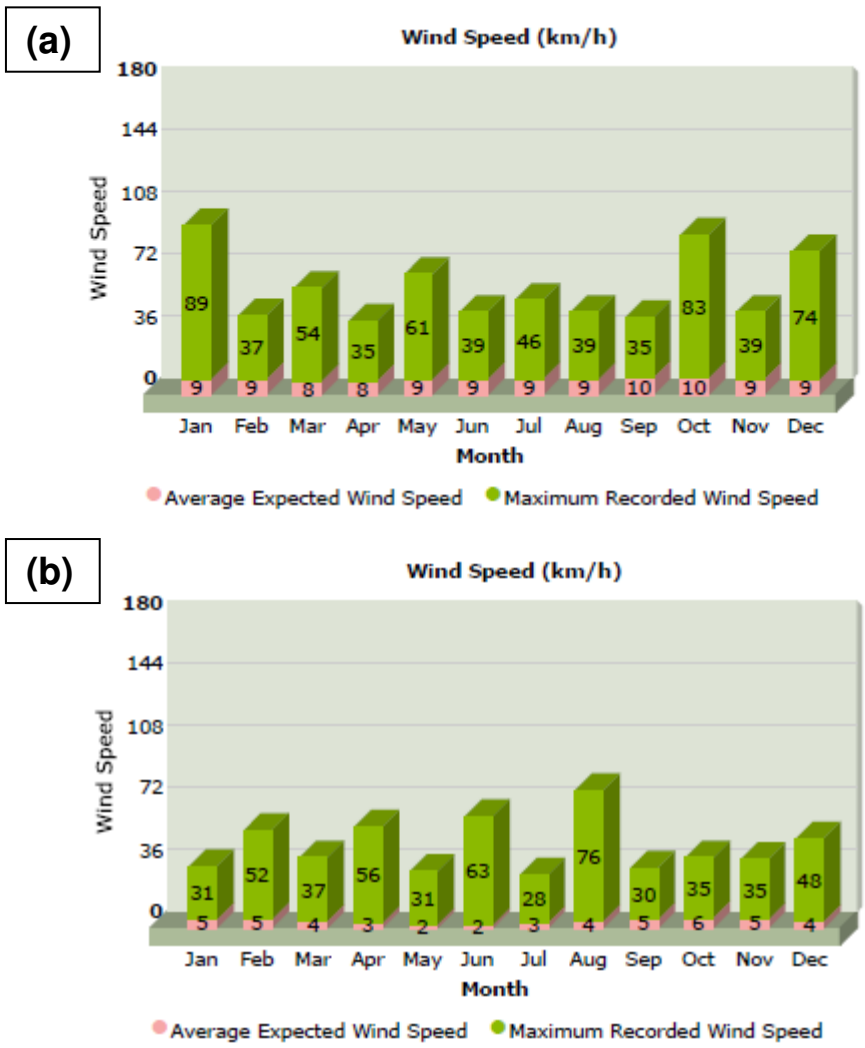


Figure 7.11: Average daily wind speed for Louis Trichardt **(a)** and Musina **(b)**

7.3.3 Geology[2]

This section provides an overview of the Geology in the greater Soutpansburg area.

- **Stratigraphy**

Although featuring so prominently in the landscape of the Limpopo Province, the Soutpansberg Group rocks did not attract much scientific attention in the past, since they are almost devoid of any economic mineralization. The rocks give rise to a mountainous, wedge-shaped terrain, which extends from the Kruger National Park in the east, where it is 40 km wide, to Blouberg in the west. Here it wedges out against the prominent Melinda and Senotwane Faults. Outliers occur west of Blouberg, on the banks of the Limpopo River, and in Zimbabwe. A correlate of the Soutpansberg rocks is the Palapye Group in Botswana.

[2] BRANDL, G. Geology. *In* A First synthesis of the environmental, biological & cultural assets of the Soutpansberg. http://www.soutpansberg.com/workshop/synthesis/geology.htm. Accessed 17 May 2012.

The Soutpansberg rocks rest unconformably on gneisses of the Limpopo Belt and Bandelierkop Complex. Along the eastern and most of the northern margin the Soutpansberg outcrops are unconformably overlain by, or tectonically juxtaposed against, rocks of the Karoo Supergroup. The contact relationship between the Soutpansberg and Waterberg Group rocks is a tectonic one, though the latter rocks are believed to be younger. The Group is best developed in the eastern part of Soutpansberg, where the maximum preserved thickness is about 5 000 m.

The Soutpansberg Group represents a volcano-sedimentary succession which is subdivided into seven formations (Brandl, 1999). The basal discontinuous Tshifhefhe Formation is only a few metres thick, and made up of strongly epidotised clastic sediments, including shale, greywacke and conglomerate. The following Sibasa Formation is dominantly a volcanic succession with rare discontinuous intercalations of clastic sediments, having a maximum thickness of about 3 000 m. The volcanics comprise basalts, which were subaerially extruded, and minor pyroclastic rocks. The basalts are amygdaloidal, massive and generally epidotised. The clastic sediments which include quartzite, shale and minor conglomerate, can reach locally a maximum thickness of 400 m. The overlying Fundudzi Formation is developed only in the eastern Soutpansberg, and wedges out towards the west. It is up to 1 900 m thick, and consists mainly of arenaceous and argillaceous sediments with a few thin pyroclastic horizons. Near the top of the succession up to four, about 50 m thick layers of epidotised basaltic lava are intercalated with the sediments. It is followed by the Wyllie's Poort Formation, which is an almost entirely clastic succession, reaching a maximum thickness of 1 500 m. Since the formation overlies, from east to west, progressively older units, its lower contact is interpreted to form a regional unconformity. Resistant pink quartzite and sandstone with minor pebble washes dominate the succession, with a prominent agate conglomerate developed at the base. The uppermost unit is represented by the Nzhelele Formation, which consists of a 400 m thick volcanic assemblage (Musekwa Member) at the base, followed by red argillaceous and then by arenaceous sediments. Maximum preserved thickness is of the order of 1 000 m. The volcanics consist of basaltic lava and several thin, though fairly consistent horizons of pyroclastic rocks of which one is copper-bearing.

North of the main Soutpansberg outcrop two additional units, the Stayt and Mabiligwe Formations, are recognized. The former succession which is preserved between two prominent faults has a maximum thickness of 1 800 m. Basaltic lava is developed at the base, followed by argillaceous sediments with thin interbeds of pyroclastic rocks. Agate conglomerate and pink quartzite are capping the top. Copper mineralization is known to occur in strongly fractured portions of the succession. The Mabiligwe Formation is confined to a small area along both banks of the Limpopo River, having a thickness of at least 50 m. It is entirely a clastic succession, with no volcanics developed except for a thin tuffaceous horizon (Barker, 1979; Brandl, 1981, 1986, 1987 & 2002).

- **Structural geology**

The Soutpansberg strata which are tilted gently towards the north are truncated by numerous extensional faults. Two fault systems are recognized, the dominant one trending ENE (parallel to the regional strike) and the other one NW to WNW. These structures generally delineate discrete elongated blocks. The majority of the faults are believed to have been initiated in pre-Karoo or even during Soutpansberg times, with most of the structures having been reactivated in post-Karoo times. The Soutpansberg rocks are unfoliated, but are in places strongly fractured.

- **Intrusive rocks**

Dykes and sills of diabase are plentiful in the Soutpansberg rocks. The former intruded often along fault planes, whereas the sills were mainly emplaced along the interface of shale and competent quartzite. Some of the diabase intrusions are probably synchronous with the Soutpansberg volcanism.

- **Economic geology**

The Soutpansberg rocks are not well endowed with economic minerals, and only copper mineralization, considered to be subeconomic, is reported from its eastern part. Salt is produced at the "Soutpan" from brines pumped up from deep wells. A number of thermal springs occur, and they are invariably associated with recently re-activated post-Karoo faults. The mountains, which receive exceptional high rainfall, play a unique role in recharging the regional groundwater, in particular in the area north of Soutpansberg.

The age of the Soutpansberg rocks is only poorly constrained. Rb-Sr whole rock ages obtained so far from the volcanic rocks which are, however, hydrothermally altered suggest that the Soutpansberg Group, or at least its lower part, was deposited sometime between 1 974 and 1 800 million years (Barton, 1979; Cheney et al., 1990)

7.3.4 Soils and Agricultural Potential

- **Soils**

As indicated on the land type map in the **Figure 7.12**, there are a number of separate land types occurring within the study area. These are summarized as follows:

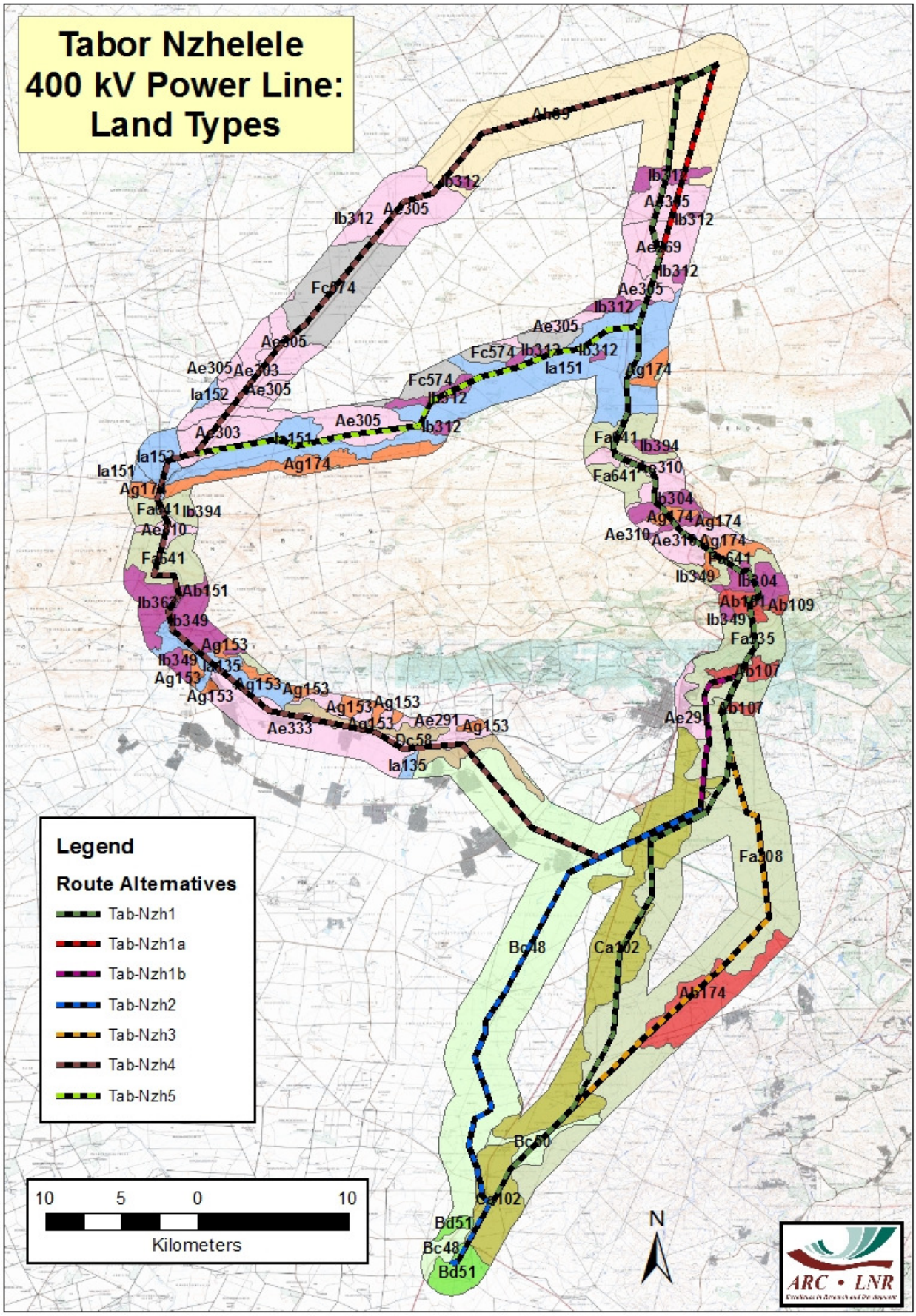


Figure 7.12: Land Type Map

These are summarized as follows:

- **Ab107, Ab109, Ab151, Ab174** (Red, highly weathered, structureless soils)
- **Ae269, Ae291, Ae250, Ae303, Ae305, Ae310, Ae333** (Red, lightly weathered, structureless soils)
- **Ag153** (Red, lightly weathered, structureless soils, <300 mm deep)
- **Ah89** Red and yellow, lightly weathered, structureless soils)
- **Bc48, Bc50** (Mainly red, slightly weathered, unstructured soils, often on plinthite)
- **Bd51** (Mainly grey-brown, slightly weathered, unstructured soils, often on plinthite)
- **Ca102** (Mixed plinthic and clay soils)
- **Dc58** (Mixed duplex and swelling clay soils)
- **Fa308, Fa535, Fa641** (Shallow soils, sometimes rocky, little lime)
- **Fc574** (Shallow soils, sometimes rocky, usually some lime)
- **Ia135, Ia151, Ia152** (Deep, alluvial soils)
- **Ib304, Ib312, Ib349, Ib362, Ib394** (Rocky areas [>60% rock], often steep with shallow soils)

The main characteristics of each of the land types are given in **Table 7.2** below (the colours correspond to the map in the **Figure 7.12**). The soils were classified according to MacVicar *et al*, (1977), with the dominant **dryland*** agricultural potential class (high, medium or low) within each land type indicated in **bold type**. (*In certain land types, more than one class is approximately equally dominant, so more than one figure appears in bold*)

NOTES:

- **dryland** agricultural potential refers to the soil characteristics only and does not take prevailing local climatic conditions/restrictions into account.
- "High" potential soils; refers to those soils generally more than 900-1200 mm deep, with medium texture, lacking significant structure and without any drainage restrictions.
- "Moderate" potential soils; refers to those soils either between approximately 500 mm and 900 mm deep, or with significant restrictions such as soil structure, lack of fertility caused by sandy texture or the like.
- "Low" potential soils; these are generally shallow to very shallow, often with rock, or have severely restricting soil structure or occur in wetland areas

Table 7.2 Soil properties per land type: Tabor-Nzhelele study area

LAND TYPE	DOMINANT SOIL(S)	DOMINANT DEPTH (mm)	DOMINANT SOIL CHARACTERISTICS	AGRIC. POTENTIAL		
				HIGH	MOD	LOW
Ab107	Hutton 14/24/16/26	300-1200	Red, structureless, loamy soils on rock	**46.7**	26.9	26.4
Ab109	Hutton 17/18	900-1200	Red, structureless, clayey soils on rock	**81.5**	11.4	7.1
Ab151	Hutton	600-1200	Red, structureless, loamy/clayey	**71.5**	17.0	11.5

	16/17/26/27		soils on rock			
Ab174	Hutton 27/28	600-900	Red, structureless, clayey soils on rock	3.0	**59.0**	38.0
Ae269	Hutton 44/46	600-1200	Red, structureless, sandy/loamy soils, usually calcareous, on rock	**72.1**	0.0	27.9
Ae291	Hutton 36/37	500-1200	Red, structureless, loamy/clayey soils on rock	**48.0**	34.4	17.6
Ae303	Hutton 34/35	400-600	Red, structureless, sandy soils on rock	6.5	**87.5**	6.0
Ae305	Hutton 30/31/32	>1200	Red, structureless, sandy soils on rock	24.4	**75.6**	0.0
Ae310	Hutton 36	750-1200	Red, structureless, loamy soils on rock	**45.0**	**48.5**	6.5
Ae333	Hutton 34/35	400-800	Red, structureless, sandy soils on rock	11.0	**64.5**	24.5
Ag153	Hutton 36/37	200-700	Red, structureless, loamy/clayey soils on rock	0.0	6.2	**93.8**
Ag174	Hutton 36/37	300-600	Red, structureless, loamy/clayey soils on rock	0.0	**59.0**	41.0
Ah89	Hutton + Clovelly 36	400-1000	Red & yellow, structureless, loamy soils on rock	10.5	**61.5**	28.0
Bc48	Hutton + Clovelly 36	400-1000	Red & yellow, structureless, loamy soils on rock	7.2	**47.4**	35.4
Bc50	Hutton + Clovelly 36	400-1000	Red & yellow, structureless, loamy soils on rock	7.2	**47.4**	35.4
Bd51	Hutton + Clovelly 36	400-900	Red & yellow, structureless, loamy soils on rock	15.0	**59.0**	26.0
Ca102	Hutton 26/36	400-750	Red, weakly/moderately structured, loamy/clayey soils on rock	0.0	**89.6**	10.4
Dc58	Bonheim + Valsrivier	>1200	Dark brown, structured, clay soils	36.0	**52.0**	12.0
Fa308	Glenrosa + Mispah	100-600	Brown, structureless, loamy soils on rock	0.0	29.5	**70.5**
Fa535	Glenrosa + Mispah	150-250	Brown, structureless, loamy/clayey soils on rock	0.0	33.8	**66.2**
Fa641	Glenrosa + Mispah	150-250	Brown, structureless, loamy soils on rock	0.0	20.0	**80.0**
Fc574	Glenrosa + Mispah	100-600	Brown, structureless, loamy soils, usually calcareous, on rock	6.0	**53.7**	40.3
Ia135	Oakleaf + Valsrivier	900-1200+	Brown, weakly structured, loamy/clayey alluvial soils	**70.0**	17.0	13.0
Ia151	Oakleaf 44/45/46	>1200	Brown, weakly structured, sandy/loamy, calcareous alluvial soils	**78.0**	18.0	4.0
Ia152	Oakleaf 16/25/26	>1200	Brown, weakly structured, loamy, alluvial soils	**59.5**	21.8	18.7
Ib304	Rock + lithosols	100-300	Brown, loamy lithosols on rock	3.3	9.2	**87.5**

Ib312	Rock + lithosols	100-300	Brown, loamy lithosols on rock	4.0	9.5	**86.5**
Ib349	Rock + lithosols	100-300	Brown, loamy lithosols on rock	5.0	8.2	**86.8**
Ib362	Rock + lithosols	100-300	Brown, loamy lithosols on rock	5.0	8.8	**87.2**
Ib394	Rock + lithosols	100-300	Brown, loamy lithosols on rock	5.0	8.0	**87.0**

- **Agricultural Potential**

As can clearly be seen from **table 7.2**, there is a great difference between land types in terms of both the soils occurring as well as the associated agricultural potential. There is also a significant difference in the **dominance** of the agricultural potential classes within each land type.

The dominant class of agricultural potential per land type is shown in the Agricultural Potential map in **Figure 7.13**. It should be noted that for several land types, there is no one single class which is dominant, so a combination symbol (MH = high and moderate potential soils, ML = moderate and low potential soils).

If the Land Capability map in **Figure 7.12** is used, the areas of dominant agricultural potential class per land type (colours as for the map in **Figure 7.13**) are as follows:

Table 7.3: Dominant dryland agricultural potential class per land type

Class	Land Types	Soil characteristics
High	Ab107, Ab109, Ab151, Ae269, Ia135, Ia151, Ia152	Deep, friable, structureless
Moderate to high	Ae291, Ae310	*Mixture of* **High** *and* **Moderate** *soils*
Moderate	Ae303, Ae305, Ae333, Ag174, Ah89, Bd51, Ca102, Dc58	Moderately deep, some structure
Moderate to low	Ab174, Bc48, Bc50, Fc574	*Mixture of* **Moderate** *and* **Low** *soils*
Low	Fa308, Fa535, Fa641, Ib304, Ib312, Ib317, Ib349, Ib362, Ib394	Shallow, rocky and/or clayey with structure. Also wet soils.

From this table and the agricultural potential map in **Figure 7.13**, it would appear that a significant number of land types have moderate and/or high potential soils, which would appear to be a very favourable situation. However, when the rainfall map (**Figure 7.9**) is taken into consideration, it can also be seen that most of the area has rainfall of less than 550 mm (generally accepted as the absolute minimum for long-term rain-fed cultivation), and the northern portion is below 400 mm per annum.

The main potential for cultivation throughout most of the study is therefore irrigation, using available water sources, but this will be very localized, as no major rivers occur.

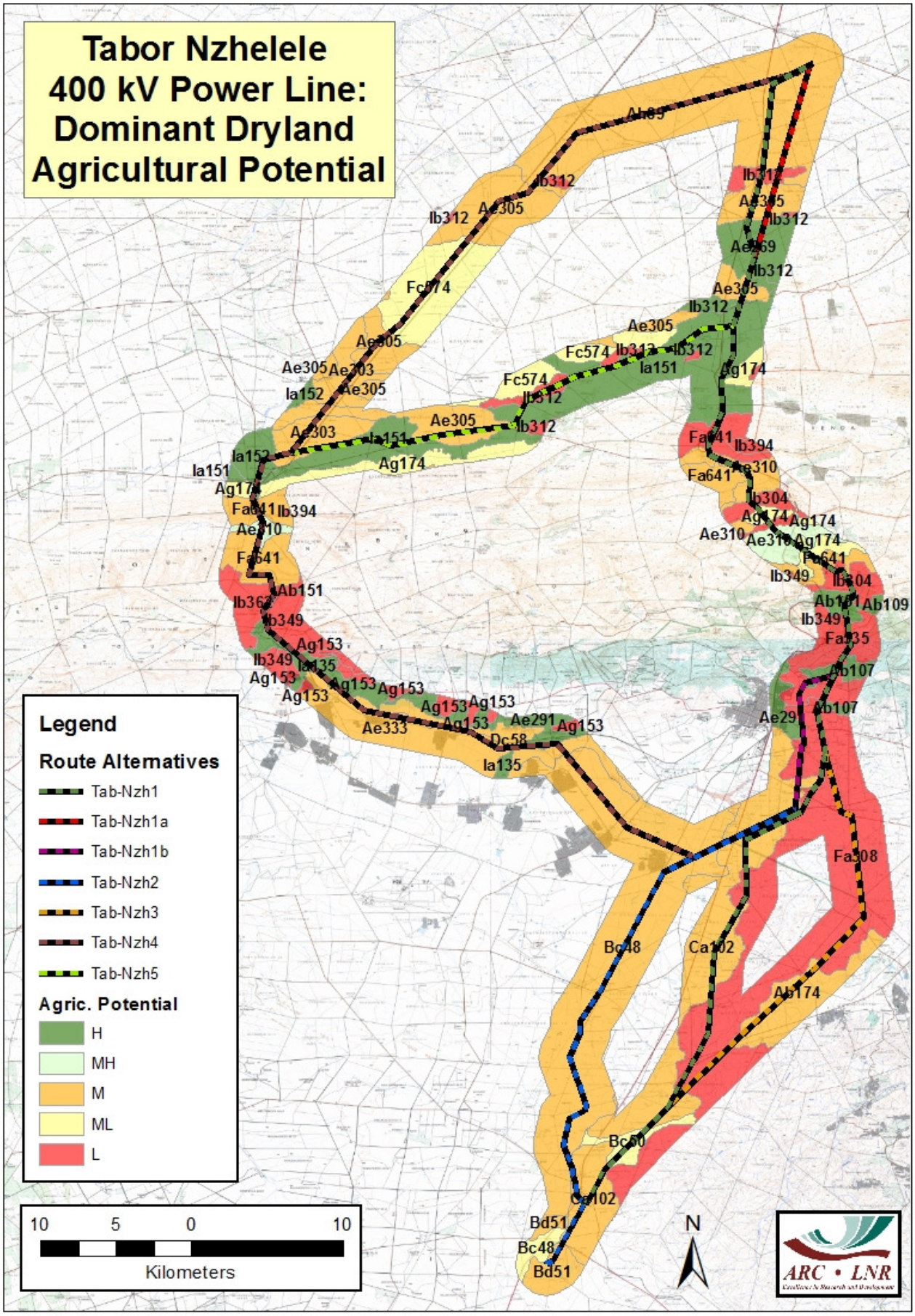


Figure 7.13: Agriculture Potential Map

- **Grazing capacity**

The Tabor-Nzhelele study area lies in the north-eastern bushveld, and the grazing capacity (measured in hectares required for one large stock unit) is generally around 10-12 ha/LSU south of the Soutpansberg, rising to around 15-16 ha/LSU in the drier areas to the north (Schoeman & van der Walt, 2004).

This classification does not apply to game farming, where more detailed specialized knowledge is required, mainly in terms of relating plant species composition in both the grass layer and woody layer to the requirements of various grazing and/or browsing species of game.

7.3.5 Natural Vegetation

The proposed 100km Tarbor to Nzhelele 400kV powerline bisects three major vegetation units namely Makhado Sweet Bushveld (SVcb 20), Soutpansberg Mountain Bushveld (SVcb 21) and Musina Mopane Bushveld (SVmp 1) as well as two minor vegetation units namely Limpopo Ridge Bushveld (Svmp 2) and the Northern Mistebelt Forest (Foz 4). Large areas of the proposed alignment bisect game and hunting farms which comprise the natural vegetation composition although certain sections of the alignment occur adjacent to transformed bushveld including agricultural lands, mining activities, forestry activities, as well as degraded bushveld including dense areas of bush encroachment especially to the north of the Tarbor substation towards the southern slopes of the Soutpansberg.

- **Makhado Sweet Bushveld (SVcb 20)**

  - *Distribution:*
    Makhado Sweet Bushveld is distributed in the Limpopo Province straddling the Tropic of Capricorn. It occurs on the plains south of the Soutpansberg, east of the Waterberg and on the apron surrounding the Blouberg and Lerataupje Mountains, and north of the Polokwane Platea and west of the escarpment, with extensions to Mokopane to the south and to the north of Vivo.

  - *Vegetation & Landscape Features:*
    Makhado Sweet Bushveld occurs on slight to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poor developed grass layer. The vegetation around the alignments consist of game and hunting farms as well as cattle grazing activities and small scale agricultural activities.

  - *Conservation Status:*
    This vegetation unit is currently considered as Vulnerable. The conservation target is 19%, with just over 1% statutorily conserved mainly in the Bellevue Nature Reserve. Some 27% already transformed, mainly by cultivation, with some urban

and built up areas. The southwestern half of the unit has densely populated rural communities. (Mucina & Rutherford 2006).

- **Soutpansberg Mountain Bushveld (SVcb 21)**

  - *Distribution:*
    Soutpansberg Mountain Bushveld occurs on the lower to higher mountains, highest in the west, splitting into increasing number of lower mountains towards the east. Dense tree layer and poorly developed grass layer. The topography of the east-west-orientated ridges of the mountain changes dramatically over short distances, resulting in orographic rain on the southern ridges, and a rainshadow effect on the northern ridges. Because of this topographic diversity, the Soutpansberg Mountain Bushveld comprises a complex mosaic of sharply contrasting kinds of vegetation within limited areas. The main vegetation variations within the Soutpansberg Mountain Bushveld are subtropical moist thickets (mainly along the lower-lying southern slopes on steep clayey soils of volcanic origin), mistbelt bush clumps (within the mistbelt of the southern and central ridges of the mountain, or rugged quartzitic outcrops with shallow sandy soils), relatively open savanna sandveld (on both deep and shallow quartzitic sands along the dry middle and northern slopes of the mountain), and arid mountain bushveld (along the very arid northern ridges of the mountain)(Mucina et al., 2006).

  - *Vegetation & Landscape Features:*
    Soutpansberg Mountain Bushveld occurs within the Limpopo Province on the slopes of the Soutpansberg Mountain, Blouberg and Lerataupje Mountains to the west; extending eastwards on the lower ridges including Khaphamalia and Makonde Mountains. Altitude varies between 600-1 500m (Mucina & Rutherford 2006).

  - *Conservation Status:*
    This vegetation unit is currently considered as Vulnerable. The conservation target is 24%, with just over 2% formally protected within the Blouberg, Happy Rest and Nwanedi Nature Reserves. A smaller area is conserved in other reserves. Some 21% already transformed, mainly by cultivation (14%) and (6%) plantations. High rural human populations densities, particularly in the eastern section of the unit (Mucina & Rutherford 2006).

- **Musina Mopane Bushveld (SVmp 1)**

  - *Distribution*
    Limpopo Province on undulating plains from around Baines Drift and Alldays in the west, remaining north of the Soutpansberg and south of the Limpopo River (but also occurring to the north of Zimbabwe), through Musina and Tshipise to Malongavlakte, Masis and Banyini Pan in the east. Altitude about 300m in the eastern Limpopo Valley up to 800m.

- *Vegetation and Landscape Features*
  Undulating to very irregular plains, with some hills. In the western section, open woodland to moderately closed shrubveld dominated by *Colophospermum mopane* on clayey bottomlands and *Combretum apiculatum* on hills. In the eastern section on basalt, moderately closed to open shrubveld is dominated by *Colophospermum mopane* and *Terminalia prunioides*. On areas with deep sandy soils, moderately open savanna dominated by *Colophospermum mopane*, *Terminalia sericea, Grewia flava* and *Combretum apiculatum*. Field layer well developed (especially on the basalt), open during the dry season; the herbaceous layer is poorly developed in areas with dense cover of *Colophospermum mopane* shrubs, for example north of Alldays bordering the Limpopo floodplain.

- *Conservation Status*
  Least Threatened. Target 19% with only 2% statutorily conserved in the Mapungubwe National Park as well as M+Nwanedi and Honnet Nature Reserved. Additionally, about 1% conserved in the Baobab Tree Reserve. Roughly 3% transformed, mainly by cultivation. Erosion is high to moderate.

- **Limpopo Ridge Bushveld (Svmp 2)**

  - *Distribution*
    Limpopo Ridge Bushevld occurs on the hills and ridges, such as Madiapala in the lower Mogalakwena River basin in the west through a cluster of hills in the Pontdrift area including Poortjieberg and Tsolwe, eastwards including Mapungubwe Mountain in the Mapungubwe National Park through the hills and ridges in the vicinity of the Limpopo River further downstream including Ha-Tshansi at Musina, Ha-Dowe and Maremani. Also including hills and ridges well away from the Limpopo River north of the Soutpansberg and generally east of the Sand River (e.g. Thsitangai, Bloukop and Ha-Manenzhe) through some rugged areas in the far northern Kruger National Park. Altitude varies from about 300 m in the east to 700 m, with the summit of a few hills in the west around 1000 m (Mucina & Rutherford 2006).

  - *Vegetation and Landscape Features*
    Extremely irregular plains with ridges and hills. Moderately open savanna with poorly developed ground layer. Umbrella-shape canopied Kirkia acuminate is prominent on some ridge skylines with the often enormous *Adansonia digitata* on shallow calcerous gravel, the shrub *Catophractes alexandri* is dominant on cal-silicate soils. These are particularly striking landscapes with rock walls and passages with areas of sandstone of the Clarens Formation (e.g. within the Mapungubwe National Park) (Mucina & Rutherford 2006).

  - *Conservation Status*
    Least Threatened. Target 19% with some 18% statutorily conserved mainly in the Mapungubwe National Park as well as the Kruger National Park. An additional 2% conserved in the Baobab Tree Reserve (thus together attaining the conservation

target). Only about 1% transformed, mainly for cultivation and mining activities (Mucina et al. 2006).

- **Northern Mistebelt Forest (Foz 4)**

  - *Distribution*
    Limpopo and Mpumalanga Provinces as well as Swaziland. Occuring along the Soutpansberg from Blouberg in the northwest to the Samandou Plateau in the northeast and further southwards (including the Northern Escarpment) from Abel Erasmus Pass (Olifants River) to the surroundings of Badplaas and Barberton. In northern Swaziland in fire refugia and cooler sheltered areas along a north-south trending Lowveld/highveld transition. Most of the patches occur in an altitudinal belt spanning 1 050 m to 1 650 m (Mucina & Rutherford 2006).

  - *Vegetation and Landscape Features*
    Tall, evergreen afrotemperate mistbelt forests occurring primarily on the east-facing fire refugia such a subridge scarps and moist sheltered kloofs where they form small, fragmented patches. The most common canopy trees include *Xymalos monospora, Podocarpus latifolius, Combretum kraussi, Cryptocarya transvaalensis, Scefflera umbellifera, Syzigium gerrardii, Olea capensis* subsp. *macrocarpa, Psdrax obovata* subsp. *elliptica, Pterocelastrus galpinii*. In the understorey *Psychotria zombamontana, Canthium kuntzeanum, Gymnosporia harveyana, Peddiea africana*, *Pavetta inandensis, Mackaya bella, Sclerochiton harveyanus* (Mucina & Rutherford 2006).

  - *Conservation Status*
    Least Threatened. Target 30% with some 10% statutorily conserved in Blyde River Canyon, Lekgalameetse, Songimvelo, Makobulaan, Malalotja, Nelshoogte, Barbeton and Starvation Creek Nature Reserves. More than 25% enjoys protection in privately owned nature reserves including Wolberg Wilderness Area, In-De-Diepte, Sudwala, Mac Mac, Buffelskloof, Mount Sheba. Alien vegetation such as *Solanum mauritianum, Caesalpinia decapetala, Acacia mearnsii* and *Lantana camara* can be locally of concern. Encroaching subsistence farming, firewood collection in communal areas and selective harvesting of bark are viewed as serious potential threats (Mucina et al. 2006).

7.3.6 Animal Life

The faunal survey focused on mammals, reptiles and amphibians of the study area.

- **Mammals**

In 2002 the Endangered Wildlife Trust (EWT) and the IUCN's Conservation Breeding Specialist Group instigated a project to initiate a concerted effort by mammal specialists to assess the status of all mammals in South Africa. The primary threats impacting

negatively on many mammals include habitat loss and land transformation through deforestation, agriculture, timber planting and urban and industrial development. Poisoning, pollution and hunting have also been listed as having a negative impact on a number of mammals. The result of this collaborative effort was a detailed compilation of knowledge from many specialists; resulting in an updated status of Red List as mammal species. Taxon Data Sheets and distribution maps for each of the 295 species and subspecies of South African mammals were evaluated. Of the total number of species and subspecies evaluated; 57 (19.3%) were assigned threat categories according to the IUCN Red List criteria (version 3.1). These are divided into:

- 10 (3.4%) classified as Critically Endangered (CE)
- 18 (6.1%) classified as Endangered (E) and
- 29 (9.8%) classified as Vulnerable (VU)

A total of 53 (18%) species were assessed as being Data Deficient (DD) and therefore a threat category could not be assigned to these species. A total of 38 (12.8%) species were assessed as being Near-Threatened (NT) and 147 (49.8%) as Least Concern (LC) (Friedmann & Daly 2004).

As a result of this initiative, increasing data is available for the threatened mammals of the Limpopo Province. In Limpopo Province, the majority of large mammals which are considered as threatened are only found in National Parks or other conservation areas such as private game reserves, and it is neither practical nor beneficial to re-introduce them into unprotected natural areas. Threatened small mammals, such as the White-tailed Mouse, however, are not confined to conservancies and occur in varied habitats in the province and are significantly impacted on by human activities and urgent conservation attention needs to be directed towards the threatened small mammal species in the province.

Limpopo is faunally diverse with a high mammalian species richness occurring in savannahs and grasslands, which could be as a result of the wide variety of habitats available. In Limpopo Province, savanna and mountainous grassland areas with the availability of sufficient cover, karst areas, wetlands, pans and a well-managed mosaic of short and tall grassland, are habitats that significantly contribute towards the ecological requirements of certain mammal species. Certain species in Limpopo, towards which conservation efforts for habitat protection should be directed, have been identified. Priority species can be used to emphasise key habitats, which are of conservation concern. These species thus contribute towards identifying priority areas of conservation importance and in determining the conservation value of land. Anthropogenic land conversion and habitat degradation and fragmentation are major threats to the continued existence of endemic and threatened fauna in the province.

The Soutpansberg has a remarkable diversity of mammals making up 60% of the total number of species that occur in South Africa. There are more mammal species in the Soutpansberg than in the Cape Floristic Kingdom (127). The whole of the Kruger National

Park only contains two more species of mammals than the Soutpansberg. It is particularly rich in bats, carnivores and larger hoofed animals. A total of 145 species has been recorded in the Soutpansberg (Gaigher & Stuart 2003) (see **Table 7.4** below).

Table 7.4. Number of mammal species per order as recorded for the Soutpansberg in relation to South Africa (Gaigher & Stuart 2003).

Order	Number Species		%
	Soutpansberg	S. A.	
INSECTIVORA	11	35	31
CHIROPTERA	36	55	65
PRIMATES	5	5	100
PHOLIDOTA	1	1	100
LAGOMORPHA	3	6	50
RODENTIA	31	64	48
CARNIVORA	26	34	76
TUBULIDENTATA	1	1	100
PROBOSCIDEA	1	1	100
HYRACOIDEA	2	3	66
PERISSODACTYLA	3	4	75
ARTIODACTYLA	25	33	76
TOTAL	145	242	60

The high density settlements and massive habitat transformation around Makahado and associated illegal hunting and poaching; limits the suitability of these areas for larger mammal species. The collection or harvesting of wood (stumps) and rock material as well as the frequent burning of the vegetation reduces available refuge habitat an exposes remaining smaller terrestrial mammals to increased predation levels. The use of wire snares for high intensity poaching activities will significantly affect remaining smaller mammal species such as rabbits and mongooses. Secondary access roads and vehicles (motor cars, motor cycles, quad bikes) increase access to the open areas as well as potential road fatalities. Major road networks with high vehicular traffic increase the risk of road fatalities (hedgehogs, hares) of mammals. Smaller mammal species are extremely vulnerable to feral cats and dogs.

Several Greater Kudu (*Tragelphagus strepsiceros*), Common Duikers (*Sylvicarpa grimmia*) as well as an adult male Bushbuck (*Tragelaphus scriptus*) were observed in the denser Acacia woodland vegetation units along the Tabor-Nzhelele alternative alignments. Several Impala (*Aepyceros melampus*) were observed in the open woodland vegetation units. The bush encroached areas along alternative alignments improves the habitat for Impala and restricts poaching activities due to the impenetrable thickets.

Vervet Monkeys (*Ceropithecus aethiops*) were observed foraging in a Cluster Broom Fig (*Ficus sur*). Evidence (spoor) of several antelope species were observed along the informal dirt roads and human pathways including Bushbuck (*Tragelaphus scriptus*) and Common Duiker (*Sylvicarpa scriptus*). Slender Mongoose was observed running across the N1 as well as secondary roads. Several rodent burrows (most likely Bushveld Gerbils) were

observed within the sandy sections of the alignment as well as adjacent to the Tabor substation.

Several Aardvark (*Orycteropus afer*) burrow systems where observed during the helicopter fly-over along the Tabor-Nzhelele alternative 2 alignment. Several recently excavated burrows were found in open woodland, scrub and grassland, especially where these are associated with sandy ground. Nevertheless, they are capable of utilizing heavy soils and are found in areas of mopane woodland and other types of hard ground, and on heavy red soils of parts of the Subregion. They are associated particularly with heavy utilized grassland where there are termite populations (Skinner and Smithers, 1991).

Apart from small exploratory scratchings, which show clearly the impression of the broad front claws, aardvarks appear to make three types of excavations. The first are shallow diggings, often in flat ground or penetrating termitaria, which are only sufficiently deep to give access to the food. Some of these burrows may penetrate a termitarium to a depth sufficient to cover the head and shoulders of the animal, or allow it to disappear altogether. These excavations are not used as refuges and normally are not revisited. The second type of burrow, dug overnight, is a temporary refuge and may penetrate several metres shallowly underground. These may be re-used over a period of a day or two or may be returned to sporadically. They usually have a chamber at the end to allow the individual to turn around. The third type of burrow is the most permanent and is used as a shelter where the young are born. These permanent shelters may extend deeply into the ground, have an extensive burrow system with numerous chambers, and several entrances. Burrows, when unoccupied, provide both shelter and safe refuge for a wide range of mammals, birds, reptiles and insects (Skinner and Smithers, 1991).

The dense Acacia and Combretum woodland habitats offer favourable habitat for arboreal mammal species such as Galagos, Woodland Doormouse and Tree Rats. The Soutpansberg Conservancy provides important habitat for several larger and smaller mammal species. Larger mammal species including Giraffe, Eland, Plains Zebra, Kudu, Impala, Blue Wildebeest, Common Duiker, Grey Rhebok, Reedbuck, Blesbuck, Bushbuck, Warthogs, Red Hartebeest, Bushpigs, Antbears, Black-backed Jackal, Spotted Hyaena, Brown Hyaena, Leopard, Caracal, African Civet, African Wid Cat, Vervet Monkey, Common Warthog and Chacma Baboons.

The small Northern Mistbelt Forest pockets situated within the Soutpansberg Conservation Area provide suitable habitat for Red Duiker as well as remnant patched of closed woodland around Makhado. Throughout their range red duikers are associated with forest, forest clumps and dense thickets. They occur in riverine forest, on forest clad mountain slopes, in thickly wooded ravines and dense coastal bush (Skinner & Chimimba, 2005). The Red Duiker (*Cephalophus natalensis*) was classified as Least Concern (LC) during the Mammal Conservation Assessment (CAMP) 2002/2003 and is currently listed by Skinner and Chimimba (2005) as Lower Risk: Conservation Dependent (LR/cd). There is debate about the assignment of the species as there has been a considerable drop since the 'Rare' assessment by Smithers (1986).

The species could possibly be elevated to the 'Near-Threatened' category based on the fact that there are fewer than 10 000 mature individuals in the population as well as having only 4 locations in South Africa. The Greater St Lucia Wetland Park currently has an estimated population of 1000 or more but this is for the total population (Rowe-Rowe, D.T. 1994) which may indicate that there are fewer than 1 000 mature individuals which would potentially qualify the species as Vulnerable VU based on criteria C2ai (CAMP 2002/2003).

Evidence of Cape Clawless Otters (*Aonyx capensis*) in the form of faeces or spraints as well as quills of Cape Porcupine (*Hystrix africaeustralis*) where also observed along the riparian zone of the Sand River.

A list of mammal species observed on the site as well as species likely to occur on the site using habitat as an indicator of presence; is presented in Appendix A (see table 10) of the Fauna Specialist Report (**Appendix J**).

- *Habitat available for Sensitive or Endangered Species*
  According to the "South African Red Data Book of Terrestrial Mammals" (Smithers 1986) and Skinner and Chimimba (2003), the study area falls within the distribution ranges of 7 species which are placed into one of known threatened species (2) Endangered, (2) Vulnerable and (3) species which are presently listed as Lower Risk Near-threatened. Several Lower Risk-Conservation Dependent (LR/cd) species occur within the alignments including Giraffe, African Buffalo, Greater Kudu, Nyala, Eland, Blue Wildebeest, Red Hartebeest, Tsessbe, Blesbok, Roan, Sable, Red Duiker, Waterbuck, Impala and Klipspringer No sensitive or endangered mammals were recorded during the brief survey but suitable habitat occurs on the site and surrounding private game farms, hunting farms and provincial nature reserves (Manavhela Ben Lavin) and conservancy areas for certain rare or threatened mammal species. More comprehensive surveys undertaken over extended periods will deliver a more representative species list of mammal species likely to occur on the site.

Table 7.5: Mammal species of conservation importance possibly occurring on the proposed 400kV Tabor-Nhzehele powerline alignments (using habitat availability and distribution as an indicator of presence)

Common Names	Scientific Names	IUCN Red List	Criteria
ORDER: Rodentia			
White-tailed Mouse	*Mystromys albicaudatus*	EN	A3c
ORDER: Pholidota			
Ground Pangolin	*Manis temminchii*	LR/nt	
ORDER: Carnivora			
Brown Hyaena	*Hyaena brunnea*	LR/nt	
Cheetah	*Acinonyx jubatus*	VU	C2a(1)

Lion	*Panthera leo*	VU	A2abcd
African Wild Dog	*Lycaon pictus*	EN	C2a(1)
ORDER: Perrissodactyla			
White Rhinocerous	*Caratotherium simum*	NT	

IUCN (World Conservation Union): CR = Critically Endangered, En = Endangered, Vu = Vulnerable, LR/nt = Lower Risk near threatened, DD = Data Deficient.

A detailed description of the mammal species included in **Table 7.5** above is included in the Fauna Specialist Report (**Appendix J**)

- **Amphibians**

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Amphibians have declined dramatically in many areas of the world. These declines seem to have worsened over the past 25 years and amphibians are now more threatened than either mammals or birds, though comparisons with other taxa are confounded by a shortage of reliable data. Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. The Giant Bullfrog (*Pyxicephalus adspersus*) has been chosen as a flagship species for the grassland eco-region (Cook in le Roux 2002)

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in Limpopo Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. The general type of reproductive habitat chosen has a strong influence on the entire developmental strategy followed by many species. Most anuran larvae within Limpopo inhabit temporary habitats that range from small pools to larger artificial dams/pans situated in lower lying areas or depressions. Unpredictable temporal and spatial distributions and cyclic patterns of nutrient availability are common features of these habitats. Others develop in more complex permanent aquatic habitats as temporary invaders in established communities such as rivers, streams and the artificially created pans/dams. Numerous physical (e.g. distance from shore, oxygen concentration, substrate qualities, water depth and flow rate, site duration, and temperature) and biological (e.g. presence and distribution of vegetation, other tadpoles, other organisms including predators, and the phenology of all organisms) factors influence the spatial and temporal distribution of tadpoles among microhabitats.

As the survey was undertaken for only two days (no nocturnal surveys) during the late summer months (March) as well as on the 12th November prior to adequate rainfall only a few species of amphibians were active. No surface water was observed within any of the seasonally inundated depressions or non-perennial drainage lines along the alignments during the two assessments. Only a small shallow puddle of water was observed at the large seasonal Spies Dam constructed on a tributary of the Sand River; to the west of Makhado (immediately to the north of the Tabor-Nzhelele Alternative 4). Comprehensive herpetological surveys can only be undertaken throughout the duration of the wet season (November-March). It is only during this period that accurate frog species lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records (1999-2012); data from the Thabazimbi area collected for the South African Frog Atlas Project (SAFAP) (1999-2003) and published data, and the list provided in Appendix A (see Table 8) of the Fauna Specialist Study (**Appendix J**) is therefore regarded as likely to be fairly comprehensive.

Figure 7.14. A conglomerate of photographs of frog species likely to occur within the Tabor-Nzhelele alignments. A: Painted Reed Frog (*Hyperolius marmoratus taeniatus*), B: Boettger's Caco (*Cacosternum boettgeri*), C: Brown-Backed Tree Frog (*Leptopelis mossambicus*) juvenile colouration, D: Common River Frog (*Amietia angolensis*); E: Giant Bullfrog (*Pyxicephalus adspersus*), F: African Bullfrog (*Pyxicephalus edulis*), G: Banded Rubber Frog (*Phrynomantis bifasciatus*), H: Southern Foam Nest Frog (*Chiromantis xerampelina*), I: Bubblink Kassina (*Kassina senegalensis*), J: Russet-Backed Sand Frog (*Tomopterna marmorata*), K: Tremelo Sand Frog (*Tomopterna cryptotis*), L: Eastern Olive

Toad (*Amietophrynus garmani*), M: Mottled Shovel-nosed Frog (*Hemisus marmoratus*), N: Bushveld Rain Frog (*Breviceps adspersus*), O: Dwarf Puddle Frog (*Phrynobatrchus mababiensis*) and P: Plain Grass Frog (*Ptychadena anchietae*).

- **Reptiles**

Reptile lists require intensive surveys conducted for several years. Reptiles are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons. A total of at least 116 reptile species have been recorded in the Soutpansberg. This biodiversity is remarkably high for such a small area and makes up 36% of the total number of reptile species that have been recorded in South Africa. This is roughly the same number of species (119) that occur in the Kruger National Park. The diversity is high compared to biodiversity hotspots of the world and the species diversity per unit area is higher than that of most of these hotspots. Most of the species (92 or 79%) are either catholic or occur in "savannah" or bushveld. Nine species (8%) are mainly restricted to grassland, nine (8%) are associated with forests and five (4%) occur in wetlands. Twelve species show a distinct preference for rocky outcrops (Gaigher 2003).

A total of at least 116 reptile species have been recorded in the Soutpansberg with 111 species found for the combined locus = 2229DB, 2229DC, 2229DD, 2329BB, 2329BD (http://sarca.adu.org.za accessed on the 18-01-2013). This biodiversity is remarkably high for such a small area and makes up 36% of the total number of reptile species that have been recorded in South Africa. This is roughly the same number of species (119) that occur in the Kruger National Park. The diversity is high compared to biodiversity hotspots of the world and the species diversity per unit area is higher than that of most of these hotspots. Most of the species (92 or 79%) are either catholic or occur in "savannah" or bushland. Nine species (8%) are mainly restricted to grassland, nine (8%) are associated with forests and five (4%) occur in wetlands. Twelve species show a distinct preference for rocky outcrops (Gaigher 2003).

Table 7.6: Reptile species of conservation significance that have been recorded from the Soutpansberg Conservancy area (Gaigher 2003). Species in bold could possibly occur on the site due to the presence of suitable habitat.

Common Name	Scientific Name	Conservation Status
White-lipped snake	*Amblyodipsas micropthalmus nigra*	Near-endemic subspecies listed as 'Peripheral' (SA RDB Branch 1988)
Transvaal Quill-snouted Snake	*Xenocalamus transvaalensis*	Isolated population
Southern Brown Egg Eater	*Dasypeltis inornata*	Isolated Population
Lang's Round-Headed Worm Lizard	*Chirindia langi langi and C.l.occidentalis*	Near Endemic Subspecies
Slender Spade Snouted Worm Lizard	*Monopeltis .sphenorhynchus sphenorhynchus*	Isolated Population
Cregoi's Blind Legless Skink	*Typhlosaurus lineatus*	Endemic subspecies

	subtaeniatus and T.l. richardi	
Limpopo Dwarf Burrowing Skink	*Scelotes limpopoensis albiventris*	Near endemic subspecies. Occurrence in Soutpansberg Mountain to be verified.
Soutpansberg Rock Lizard	*Australolacerta rupicola*	Endemic species
Delalandes Sandveld Lizard	*Nucras lalandi*	Relict population (not restricted to the Mountain)
Van Dam's Girdled Lizard	*Smaug (Cordylus) vandami*	Isolated population
Soutpansberg Flat Lizard	*Platysaurus relictus*	Endemic species to the Soutpansberg. Listed as 'Restricted' (SA RDB Branch 1988)
Common Flat Lizard	*Platysaurus intermedius inopinus*	Near endemic subspecies
Transvaal Dwarf Chameleon	*Bradypodion cf.sp. transvaalensis*	Isolated Population. Revision of the group might show that it is a different species or subspecies
Kalahari Ground Gecko	*Colopus wahlbergii wahlbergii*	Isolated population
Muller's Velvet Gecko	*Homopholis mulleri*	Near Endemic
Spotted Dwarf Gecko	*Lycodactylus ocellatus soutpansbergensis*	Endemic subspecies
Black Spotted Dwarf Gecko/Cryptic Dwarf Gecko	*Lygodactylus nigropunctatus incognitus*	Endemic Subspecies

The majority reptile species are sensitive to severe habitat alteration and fragmentation. The indiscriminate killing of all snake species as well as the illegal collecting of certain species for private and the commercial pet industry (Southern African Python) reduces reptile populations especially snake populations drastically. The frequent burning of the bushveld vegetation as well as fire breaks around afforested plantations will have a high impact on remaining reptiles. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as potential refuge areas increasing the predation risks.

The proposed alignments bisect krantzes, rocky hills or outcrops, extensive areas of rocky koppies, or gorges with rocky sides. Rock outcrops especially with large exposed bedrock and boulder scree provide favourable refuges for several snake and lizard species (rupicolous reptile species). Several large termitaria and smaller termite mounds were observed along the alignments. Termite mounds offer important refuges for numerous frog, lizard and snake species. Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). These mass emergences coincide with the first heavy summer rains and the emergence of the majority of herpetofauna. Moribund termite mounds also provide nesting site for numerous snakes, lizards (varanids) and frogs. Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal reptiles (chameleons, snakes, tree agamas, geckos and monitors).

Reptile species recorded during the survey included Striped Skinks (*Trachylepis punctatissima*), Rainbow Skink (*Trachylepis margaritifer*) were observed on a small rocky outcrop to the north of the Tabor substation. Spotted Sand Lizard (*Pedioplanis lineoocellata*), Flap-necked Chameleon (*Chamaeleo dilepis*), Yellow-throated Plated Lizard (Gerrhosaurus flavigularis) as well as Southern Tree Agama (*Acanthocercus atricollis)* and Ground Agama (*Agama aculeata.distanti*) were observed within the open and closed woodland vegetation units along the alternative alignments. A Leopard Tortoise (*Stigmochelys pardalis*) was observed around Bandelierskop along the Tabor-Nzhelele alternative 2. Several Wahlberg's Snake-eyed Skinks (*Panaspis whalberghii*) were observed under logs and loosely embedded rocks within the closed woodland unit.

Road fatalities included Nile Monitor (*Varanus niloticus*), White-Throated Monitor (*Varanus albigularis*), Boomslang (*Dispholidus typus typus*) and Puff Adder (*Bitis arietans arietans*) were along the N1. A probable list of reptile species observed on the site as well as species likely to occur on the site using habitat as an indicator of presence; is presented in Appendix A (see Table 9) of the Fauna Specialist Report (**Appendix J**).

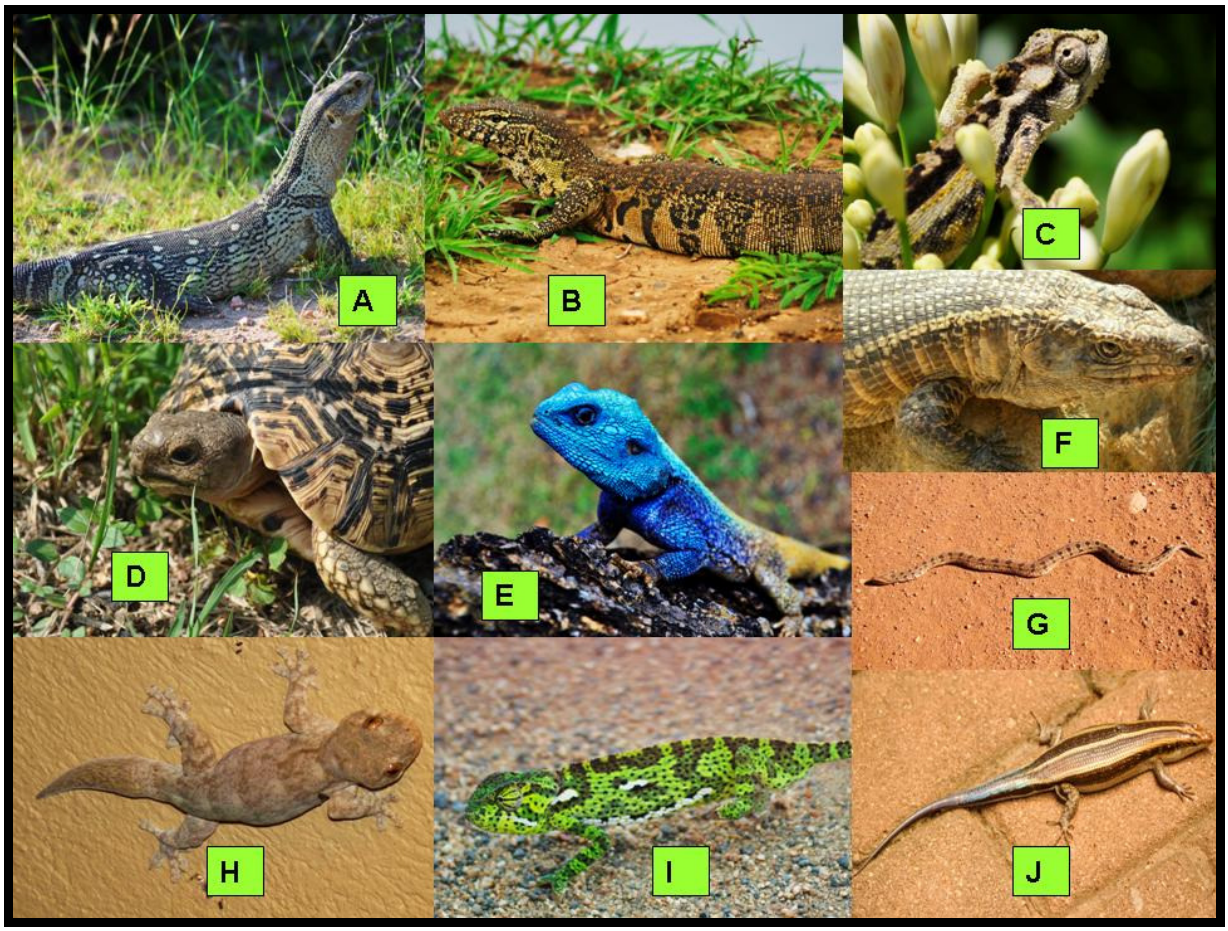


Figure 7.15: A conglomerate of photographs displaying the reptile species observed within the Tabor-Nzhelele alignments. A: Rock or White-throated Monitor (*Varanus albigularis albigularis*), B: Nile Monitor (*Varanus niloticus*); C: Transvaal or Wolkberg Dwarf Chameleon (*Bradypodium transvaalense*); D: Leopard Tortoise (*Stigmochelys pardalis*); E: Southern Tree Agama (*Acanthocercus atricolis atricolis*), F: Giant Plated Lizard (*Gerrhosaurus validus*); G: Rhombic Night Adder (*Causus rhombeatus*); H:

Wahlberg's Velvet Gecko (*Homopholis whalbergii*); I: Flap-necked Chameleon (*Chamaeleo dilepis dilepis*) and J: Five-lined or Rainbow Skink (*Trachylepis margaritifer*).

Table 7.7. Reptile species of conservation importance likely to occur on or around the proposed Tabor-Nzhelele alignments.

Common Name	Scientific Name	Red Data Status (Branch 1988)	1996 IUCN global listing
Southern African Python	*Python natalensis*	Vulnerable	Not Evaluated
Blunttailed Worm-lizard	*Dalaphia pistillum*	Peripheral	Not Evaluated
Black Whitelipped snake	*Amblyodipsas micropthalmus nigra*	Near-endemic subspecies listed as 'Restricted (SA RDB Branch 1988)	Not Evaluated
Muller's Velvet Gecko	*Homopholis mulleri*	Near Endemic listed as 'Restricted (SA RDB Branch 1988)	Lower Risk: Near Threatened
Soutpansberg Flat Lizard	*Platysaurus relictus*	Endemic species to the Soutpansberg. Listed as 'Restricted' (SA RDB Branch 1988)	Lower Risk: Near Threatened
Soutpansberg Rock Lizard	*Australolacerta rupicola*	Endemic species Listed as 'Restricted' (SA RDB Branch 1988)	Lower Risk: Near Threatened
Lang's Round Headed Worm Lizard	*Chirindia langi langi and C.l.occidentalis*	Near Endemic Subspecies Listed as 'Restricted' (SA RDB Branch 1988)	Not Evaluated

The previous Red Data book for reptiles (Branch 1988) is out dated due to the discovery of several new species, as well as the latest internationally accepted IUCN assessment criteria have not yet been applied to the region's reptiles. It is believed that many additional species are threatened, and there is a clear need to undertake new surveys to improve the information base from which assessments can be done (Harrison 2005). A recent (2005-2009) South African Reptile Conservation Assessment (SARCA) should improve the knowledge on the conservation status of our reptile species.

A detailed description of the reptile species included in **Table 7.7** above is included in the Fauna Specialist Report (**Appendix J**)

7.3.7 Sensitive Environments/Habitats on and Surrounding the Alignment

- **Soutpansberg and any rock hills and ridges**

The entire Soutpansberg Conservation area must be considered as a sensitive habitat which provides important habitat for several amphibian, reptile and mammal species. Ridges are characterized by high spatial heterogeneity due to the range of differing aspects (north, south, east, west and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and

hydrological conditions. The temperature and humidity regimes of microsites vary on both a seasonal and daily basis (Samways & Hatton, 2000). Moist cool aspects are more conducive to leaching of nutrients than warmer drier slopes (Lowrey & Wright, 1987). Variation in aspect, soil drainage (Burnett et al., 1998) and elevation/altitude (Primack, 1995) have been found to be especially important predictors of biodiversity. It follows that ridges will be characterized by a particularly high biodiversity, as such their protection will contribute significantly to the conservation of biodiversity in the area as well as the rest of Limpopo Province.

For example, a wide variety of bird groups utilize ridges, koppies and hills for feeding, roosting and breeding. These groups include some owls, falcons, nightjars, swifts, swallows, martins, larks, chats, thrushes, cisticolas, pipits, shrikes, starlings, sunbirds, firefinches, waxbills, buntings, canaries, eagles and vultures.

Ridges provide important habitat for sensitive species such as bats (roosting sites) and the eastern rock elephant shrew. Ridges and kloofs also form caves, an important habitat for highly specialized animals, e.g. bats. Variable microclimate conditions have resulted in a vast array of invertebrate communities associated with the high plant diversity characterizing ridges. Hills and koppies generally have more insects (both in terms of individuals and species) than the immediate surroundings (Samways & Hatton, 2000).

Rupicolous outcrops in the Soutpansberg including large sheets of bedrock and numerous loose boulders and crevices within north-facing sandstone outcrops provides important habitat for the Soutpansberg Flat Lizard which is listed as a lower risk 'Near Threatened'. All Limpopo Ridge Bushveld including rocky ridges and hills as well as major rocky outcrops must be considered as a sensitive habitat with unique vegetation as well as fauna (rupicolous species).

- **Northern Mistbelt Forest**

The small fragmented patches of Northern Mistbelt Forest which the Tabor-Nzehelele Alternative 1 and 4 alignments bisect must be considered as a sensitive habitat. Although this vegetation type is considered as 'Least Threatened" it provides important habitat for several faunal species; including the red listed 'Endangered" Northern Forest Rain Frog (*Breviceps sylvestris*) (Measey et al. 2011) as well as the endemic Wolkberg Dwarf Chameleon (*Bradypodium transvaalense*).

- **Natural Open Bushveld**

All remaining large open bushveld areas including (Makhado Sweet Bushveld and Musina Mopane Bushveld) situated within the private as well as provincial nature reserves, game and hunting farms must be considered as a sensitive environment with any activities carefully managed. These large open areas provide suitable habitat for several faunal species including red listed species such as the Ground Pangolin, White Rhinoceros, Lion, Cheetah and African Wild Dog. The protected Marula (*Sclerocarya birrea* subsp. *caffra*) as

well as Knob Thorn (*Acacia nigrescens*) occurring to the north of the Soutpansberg provides suitable habitat for the red listed 'Near Threatened) Mullers' Velvet Gecko (*Homopholis mulleri*).

- **Rivers/Watercourses or Non-Perennial Drainage Lines with Associated Riparian Zone**

  - Rivers and streams/drainage lines are longitudinal systems with impacts affecting both upstream and downstream habitat. The entire seasonally inundated or non-perennial drainage lines and their associated indigenous dominated riparian vegetation must be considered as sensitive habitats. Any impact on the riverine area within the study area is therefore also likely to impact on upstream and downstream areas.
  - Riparian zones have the capacity to act as biological corridors connecting areas of suitable habitat in birds (Whitaker & Metevecchi, 1997), mammals (Cockle & Richardson 2003) reptiles and amphibians (Maritz & Alexander 2007). Riparian zones may act as potential refugia for certain fauna and could allow for possible recolonisation of rehabilitated habitats. The riparian vegetation plays a vital role in the re-colonisation of aquatic macro-invertebrates as well as reptiles and amphibians (Maritz & Alexander 2007). The riparian vegetation provides vital refuge, foraging and migratory passages for species migrating to and away from the rivers. The riparian zone comprises plant communities contiguous to and affected by surface and subsurface hydrological features of perennial or intermittent water bodies (rivers and streams).
  - The riparian vegetation is dependant on the river for a number of functions including growth, temperature control, seed dispersal, germination and nutrient enrichment. Riparian vegetation comprises a distinct composition of species, often different from that of the surrounding terrestrial vegetation. Tree species are positioned according to their dependence or affinity for water, with the more mesic species (water-loving) being located closest to the river channel, often with their roots in the water, and the less water-loving terrestrial species further away from the river.

The riparian zone, of which vegetation is a major component, has a number of important functions including:

- enhancing water quality in the river by the interception and breakdown of pollutants;
- interception and deposition of nutrients and sediments;
- stabilisation of riverbanks and macro-channel floor;
- flood attenuation;
- provision of habitat and migration routes for fauna and flora;
- provision of fuels, building materials and medicines for communities (if done on a sustainable basis); and
- recreational areas (fishing - rod and line not shade or gill nets; bird watching; picnic areas etc.).

All rivers including the Sand River, Doring River and Mutamba Rives as well as several smaller non-perennial drainage lines must be considered as a sensitive habitats due to ecological functioning as well as providing suitable habitat as well as biological or dispersal corridors for remaining faunal species.

- **Seasonally Inundated Pans/Depressions**

Seasonal wetlands in the form of seasonally inundated pans or depressions comprises habitats which are restricted in extent, highly productive and which contains a high diversity of plants and animals, many of which are restricted or heavily dependant on such habitats. The seasonally inundated pans or depressions comprise the most important habitat, within the proposed alignments, for certain threatened species, e.g.: Giant Bullfrog. These shallow hydrophilic sedge and grass zones are vital breeding and nesting areas for numerous animal species, including the 'Near Threatened' Giant Bullfrog (*Pyxicephalus adspersus*) (Minter et. al. 2004). All seasonal pans with their associated vegetation are extremely sensitive to further negative impacts and must be considered sensitive habitats.

7.3.8 Avifauna

- **Study area vegetation and Land use**

While this report is an avifaunal specialist report, vegetation and micro habitats are very important in determining avifaunal abundances and likelihood of occurrences. The large study are a van be roughly divided in to three zones, north of the Soutpansberg mountains, the Soutpansberg itself, and south of the Soutpansberg. Two maps have been produced below (**Figures 7.16 and 7.17**) showing the vegetation classification of the broader area (Mucina & Rutherford, 2006), divided in to north and south.

The dominant vegetation type in the south of study area is "Makhado Sweet Bushveld". A large element of "Tzaneen Sour Bushveld" lies to the east of the route alternatives. As one moves north of Makhado (Louis Trichardt), and in to the mountains, the dominant vegetation type is "Soutpansberg Mountain Bushveld". Elements of "Soutpansberg Summit Sourveld" and "Northern Mistbelt Forest" are also present in the mountains. The patches of Afromontane forest, up to 30–40 m tall, are found in valleys and moist basins, especially where south-facing. On the lower and middle slopes, sourish mixed bushveld dominates. The mountain peaks are covered with scattered clumps of Protea bushes. The eastern portion of the Soutpansberg has been extensively afforested with commercial timber plantations. Parts of the range are also used for subtropical fruit farming, mainly avocados, mangos, nuts and citrus. The eastern portion holds various forest reserves, including Timbadola Forest Reserve, Entabeni State Forest, Klein Australië Forest Reserve, Goedehoop Forest Reserve, Roodewal Forest Reserve and Hanglip State Forest, and the private Buzzard Mountain Retreat, 20 km west of Louis Trichardt. Most of these protected areas are partly afforested and partly covered by indigenous vegetation.

North of the Soutpansberg, as one descends towards the Limpopo River, the area is dominated by "Musina Mopane Bushveld" while patches of "Limpopo Ridge Bushveld" are also present.

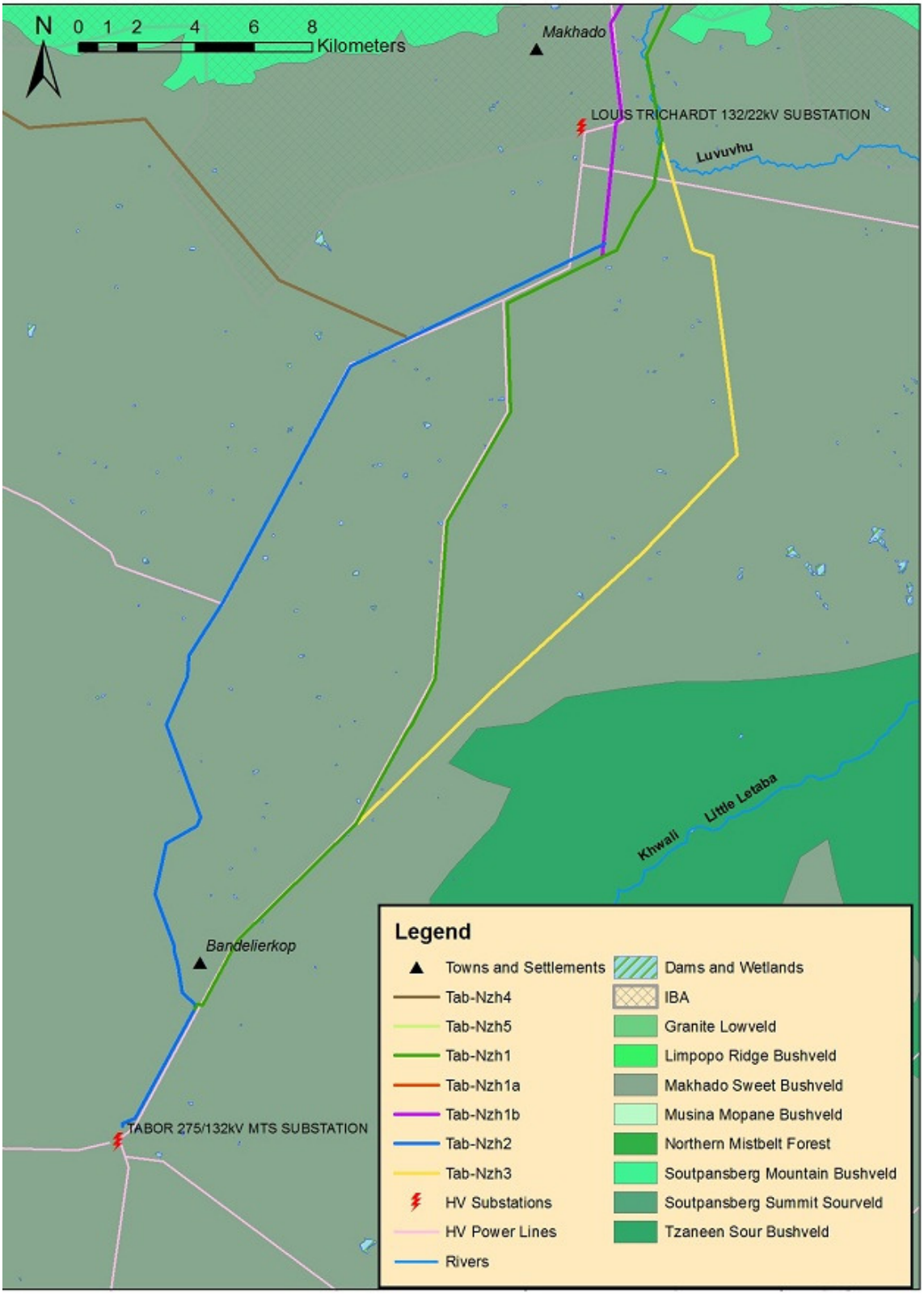


Figure 7.16: Map indicating the various line alternatives, as Towns, IBA's, Rivers and the vegetation classification for the south of the study area (Mucina & Rutherford 2006).

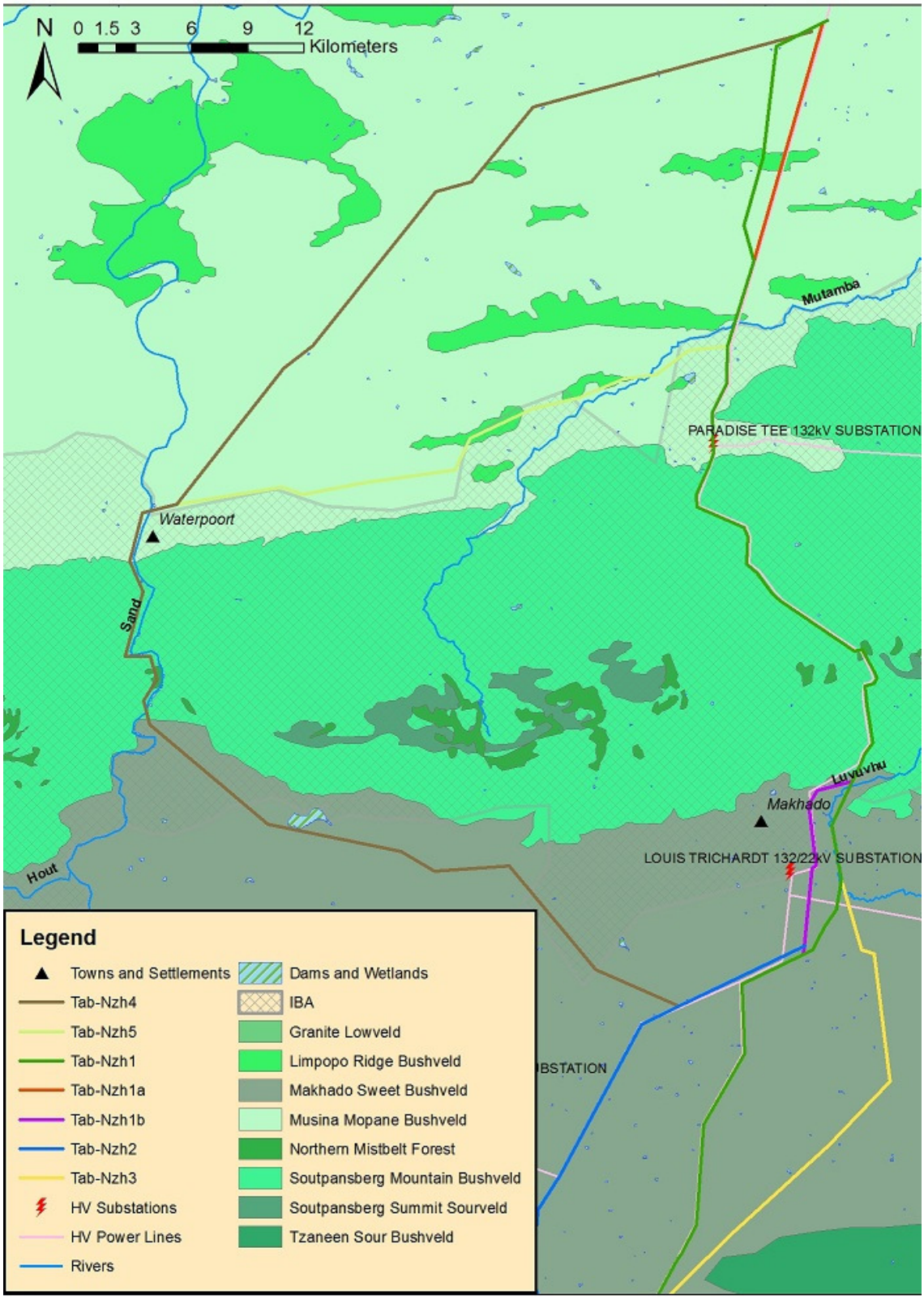


Figure 7.17: Map indicating the various line alternatives, as Towns, IBA's, Rivers and the vegetation classification for the north of the study area (Mucina & Rutherford 2006).

- **Bird micro habitats**

In addition to the description of vegetation, it is important to understand the habitats available to birds at a smaller spatial scale, i.e. micro habitats. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food sources and man-made factors. Investigation of this study area revealed the presence of the following bird micro habitats.

Undisturbed Bushveld:

As can be seen from figures two and three above, the majority of vegetation types in the area are a type of "Bushveld". "Bushveld" is a term loosely applied to small-tree woodland found mostly below 1500m (Newman, 1996). It is mainly comprised of mixed trees and bushes 5-10m high. The plant species present are related to soil type but usually include both broad-leafed and thorn bushes, while the substrate is well grassed. Pristine Bushveld is normally rich in birdlife including both arboreal and terrestrial species. Various species may occur in this micro-habitat type including Martial Eagle, Bateleur, Cape Vulture, White-backed Vulture, Southern Ground Hornbill, Red-crested Korhaan, Kori Bustard and Secretarybird. This habitat type is also very important to physically smaller bird species, which are less likely to interact directly with the proposed power lines.

Figure 7.18: A large Baobab tree seen in relatively undisturbed bushveld within the broader study area.

Disturbed Bushveld:

It is likely that the majority of Bushveld areas have been disturbed to a greater or lesser degree. Numerous private game or hunting farms are in the area, most of which are fenced creating habitat fragmentation, and many have roads, lodges or powerlines on them. Other areas of bushveld have been grazed by live-stock. These disturbed bushveld areas may contain relevant species as mentioned in the section describing undisturbed

bushveld, however, they are likely to be more important to physically smaller bird species, which are less likely to interact directly with the proposed power lines.

Figure 7. 19: Disturbed bushveld / Thornveld that has been grazed by livestock.

Mountains, Ridges and Cliffs:

Mountainous habitats are associated with the Soutpansberg in the centre of the study area. Here, many ridges, rocky cliff areas and ravines also present, especially associated with the river and various tributaries. The valleys and ravines have patches of forest (discussed below). The Mountainous areas represent a very distinct habitat type, most likely to be used by species such as the Black Stork, Peregrine Falcon, Verreaux's Eagle, African Crowned Eagle, Jackal Buzzard, Rock Kestrel, and Cape Vulture. The Soutpansberg Cape Vulture Colony is situated on a large cliff-face in the vicinity of Alternative Tab-Nzh 4. This colony was observed during the helicopter fly-over, as well as on foot by the author (**Figure 7.21**).

Figure 7.20: A rocky ridge and cliffs in the Soutpansberg, within the study area.

Figure 7.21: View of the Soutpansberg Vulture Colony situated on a large cliff face. Note vultures soaring above.

Forest:

Patches of indigenous forest are present in the mountainous regions of the study area. This micro-habitat type will mostly be important to physically smaller bird species, which are less likely to interact directly with the proposed power lines, such as Doves, Cuckoos, Wagtails, Wood-peckers, Barbets, Fly-catchers, Wattle Eyes, Trogons, Turacos, Robin-chats, and Shrikes. The red-listed Orange ground thrush and Rosy-throated Twinspot may also be found in this micro-habitat. Of more concern to the project are larger species that

may frequent indigenous forest patches, such as Bat Hawk, Martial Eagle and African Crowned Eagle.

Figure 7.22: A small stream running through evergreen montane forest.

Forestry Plantations:

The eastern portion of the Soutpansberg has been extensively afforested with commercial timber plantations. Usually these consist of Gums, Pines or Wattles, closely planted allowing for little light penetration, and the ground is therefore devoid of cover. In general, plantations are unattractive to most birds although African Olive Pigeons, Doves, as well as Forest and Steppe Buzzards may enter them. Narina Trogons may frequent the edges of pine plantations adjacent to evergreen forests. In summary then, plantations will mostly be important to physically smaller bird species, which are less likely to interact directly with the proposed power lines. They may, however, provide perching and roosting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl and Hadeda Ibises.

Figure 7.23: Extensive forestry plantations are evident on the slopes of the Soutpansberg in the vicinity of Makhado.

Arable and/or cultivated lands:

Arable or cultivated lands can represent significant feeding areas for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources readily accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds. In general, agriculture does not appear to be extensive in the study area, and this is likely to be a less significant microhabitat. Small scale agriculture (see **Figure 7.24** below) predominantly in the form of maize fields, is scattered throughout the area, while parts of the Soutpansberg are also used for subtropical fruit farming, mainly avocados (**Figure 7.26**), mangos, nuts and citrus. These fruit orchards are not likely to be important habitats for any of the larger focal species. Species such as Egyptian Goose, Hadeda Ibis, Black-shouldered Kite, Secretarybird, Abdim's Stork, and White Stork may be attracted to the other cultivated lands.

Figure 7.24: Evidence of small scale farming in the more rural settlements within the broader study area.

Figure 7.25: A centre pivot irrigation system being used on cultivated lands in the study area.

Figure 7.26: Avocado trees on a farm in the Soutpansberg.

Grassland Patches

Grasslands, in their true form, represent a significant foraging and/or hunting area for many bird species. Although the study area is not situated within the Grasslands Biome, grassland patches are present, as well as grassy savannah, were the grassy component is dominant over the woody component. Important bird species that may be found in these grassland areas of the study site are: Secretarybird, Marabou Stork, Northern Black Korhaan, Black-bellied Bustard, Southern Ground Hornbill, Kori Bustard, White Stork and Abdim's Stork. The grassland patches are also a favourite foraging area for game birds such as francolins and Helmeted Guineafowl, as well as being hunting and foraging habitat for raptors such as Cape Vulture, White-backed Vulture, Martial Eagle, Tawny Eagle, African Marsh Harrier, Lanner Falcon, Steppe Buzzard, Lesser Kestrel and Black-shouldered kite.

Figure 7.27: Relatively open and undisturbed grassland patch within the Ben Lavin Nature Reserve.

Wetlands and Dams:

Dams have become important attractants to various bird species in the South African landscape. Only a few small to medium sized man-made dams were observed during the site visit, however an examination of GIS maps and Google Earth imagery, showed many small to medium sized water-bodies in the area. Various waterfowl, such as Spur-winged geese, Egyptian geese, and numerous duck species, may frequent these areas and are vulnerable to collision with power lines. Various Storks may also frequent these water bodies, as well as fish eating raptors like the African Fish Eagle. In the context of this report, wetlands are defined as natural areas containing water permanently or seasonally. Wetlands may be frequented by Yellow-billed Stork, African Marsh Harrier, Coots, Grebes, Ducks, Geese, and African Spoonbills may make use of these areas.

Rivers or drainage lines:

Rivers in their true form represent important habitat for many species, including Black Stork, Yellow-billed Stork and a variety of other water birds, while the wooded riparian habitat along the river may provide habitat for various species such as the Hamerkop, African Darter, various cormorants, kingfishers, bee-eaters, robin-chats and numerous smaller species. Rivers also represent feeding areas for fish eating raptors such as the African Fish Eagle. Rivers and drainage lines also represent important flight paths for many species. Rivers in the study are including the Mutamba, Nzehlele, and the upper reaches of the Luvuvhu (see figures 2 and 3 above). Numerous smaller drainage lines, some of which do not always carry water are also present on site. However, these drainage lines may still serve as flight paths for several bird species.

Figure 7.28: The Mutamba River which was dry at the time of the site visit.

Table 7.8 below shows the micro habitats that each Red Data bird species (recorded in the SABAP1 data) typically frequents in the study area. It must be stressed that birds can and will, by virtue of their mobility, utilise almost any areas in a landscape from time to time. However, the analysis in **Table 7.8** represents each species' most preferred or normal habitats. These locations are where most of the birds of that species will spend most of their time – so logically that is where impacts on those species will be most significant.

Table 7.8: Red Listed species recorded in the quarter degree squares covering the study area (Harrison et al 1997)

Species		**Report rate (%)**						**Micro habitat**
		2229DB	**2229DD**	**2329BB**	**2329BD**	**2329BA**	**2330AA**	
Total species		233	231	337	245	322	334	
Number of cards submitted		14	23	113	39	39	140	
Cape Vulture	VU	21	4	5	10	49	-	Savanna Woodland, Mountains and cliffs. Forages over grassland
White-backed Vulture	VU	21	-	4	31	3	-	Savanna woodland; Bushveld
Lappet-faced Vulture	VU	21	-	-	-	5	-	Open woodland
Martial Eagle	VU	21	-	1	3	13	4	Savanna, woodlands, semi-arid shrubland
Tawny Eagle	VU	7	-	1	-	3	-	Open Savanna woodland
Bateleur	VU	29	4	6	3	-	1	Woodlands
African Marsh Harrier	VU	-	-	1	3	-	2	Wetlands and grasslands
Lesser Kestrel	VU	-	-	-	-	-	1	Grasslands
Southern	VU	29	-	-	-	-	-	Savanna, Woodland; Grassland

Ground Hornbill								
Kori Bustard	VU	50	-	-	-	-	-	Savannah woodlands; Grasslands
Pink-backed Pelican	VU	-	-	-	-	3	1	Wetlands and Estuaries
African Finfoot	VU	-	-	-	-	-	4	Slow-flowing streams
Black Stork	NT	13	-	4	13	21	3	Rivers and Kloofs
Yellow-billed Stork	NT	-	-	-	-	8	1	Inland freshwater bodies; Estuaries
Lesser Flamingo	NT	-	-	-	-	-	1	Wetlands, saltpans
Black-bellied Bustard	NT	-	-	-	-	-	1	Open Grassland
African Crowned Eagle	NT	26	-	7	-	5	19	Forest, Dense Woodland
Secretarybird	NT	29	-	4	38	33	4	Grassland, arable lands
Peregrine Falcon	NT	7	9	4	3	5	-	Ridges and Cliffs; Savannah Woodland; Towns.
Lanner Falcon	NT	7	17	6	-	26	4	Woodlands; Grasslands and Exotic plantations
Pallid Harrier	NT	-	-	-	-	-	1	Woodland edges and Grasslands
Bat Hawk	NT	-	-	-	-	-	3	Dense woodland; Riparian forests; plantation edges
Red-billed Oxpecker	NT	7	-	4	21	3	-	Open woodland
Rosy-throated Twinspot	NT	-	4	-	-	-	-	Dense Scrub; Forest fringes
Orange Ground Thrush	NT	-	-	1	-	-	-	Evergreen Forests
Short-clawed Lark	NT	-	-	-	3	3	-	Dry grassland; Acacia savanna
Greater Painted Snipe	NT	-	-	-	-	3	-	Marshlands; wetlands
African Pygmy-Goose	NT	-	-	-	-	-	14	Permanent waters with water-lilies
Half-collared Kingfisher	NT	-	-	-	-	-	7	Coastal lagoons, Wooded streams
White Stork	Bonn	14	9	6	26	5	2	Grassland, arable lands, wetland, dams
Abdims Stork	Bonn	14	4	18	-	5	10	Grassland; Savana woodland; Cultivated fields

CR = Critically Endangered; EN = Endangered; V = Vulnerable; NT = Near-threatened; Bonn = Protected Internationally under the Bonn Convention on Migratory Species.

- **Relevant bird populations**

Southern African Bird Atlas Project 1 (Harrison et al, 1997):

This data was collected over an 11 year period between 1986 and 1997. Although it is now quite old, it remains the best long term data set on bird distribution and abundance available to us at present. This data was collected on the basis of quarter degree squares, which is also a relatively large spatial scale. The species recorded in the relevant quarter degree squares could have been recorded anywhere within these squares and not necessarily on the exact site of the proposed developments. It does however provide a

good indication of what could be found in the study area. **Table 7.8** summarises data for red-listed species from these squares.

The report rates are essentially percentages of the number of times a species was recorded in the square, divided by the number of times that square was counted. It is important to note that these species were recorded in the entire quarter degree square in each case and may not actually have been recorded on the proposed site for this study.

A total of 29 Red Data species were recorded across all squares, comprising 12 Vulnerable and 17 Near-threatened. The white Stork and Abdim's Stork, which are not listed, but are protected internationally through the Bonn Convention on Migratory species, were also recorded. The most important of these species for this study are the Cape Vulture, White-backed Vulture, Martial Eagle, Bateleur, Southern-Ground Hornbill, Kori Bustard, Black Stork, African Crowned Eagle, Lanner Falcon, Abdim's Stork and White Stork. These species are historically all reasonably abundant in the area which has micro-habitat elements that may attract them, and/or are hugely vulnerable to impacts associated with overhead power lines in South Africa.

Southern African Bird Atlas Project 2:

SABAP 2 data for the pentads (which are roughly 8km x 8km squares, and are smaller than the QDGS's used in SABAP1) in the study area was also examined. There area was found to be very poorly counted in general. **Table 7.9** below shows pentads that had recorded relevant species, and shows the pentad number, number of counts, and number of species observed in that pentad, as well as the report rate for the relevant species.

Table 7.9: Relevant species recorded by SABAP2 in selected pentads.

Pentad	Counts	No. Species	Relevant species (% report rate)
2315_2950	2	61	Red-crested Korhaan (50%).
2305_2955	3	112	Black-chested Snake Eagle (33.3%); African Fish Eagle (33.3%).
2305_3000	13	146	Woolly-necked Stork (15.4%).
2300_3000	12	143	African Crowned Eagle (66.7%); Buff-spotted Flufftail (8.3%); African Fish Eagle (8.3%).
2300_2955	2	99	Woolly-necked Stork (50%); African Fish Eagle (50%); African Crowned Eagle (50%).
2300_2950	6	137	Black-chested Snake-eagle (incidental); African Crowned Eagle (incidental).
2255_2955	4	76	Verreaux's Eagle (25%); Taita Falcon (incidental)

Interestingly, of the red listed species identified in the SABAP 1 data (i.e. **Table 7.8**), only one species (i.e. African Crowned Eagle) was recorded in the SABAP 2 data for the pentads examined. This however, does not necessarily mean that the other species species do not occur here, or that they have moved from the area, post SABAP1, but may merely be due to the low counting effort of the pentads, or selective micro habitat counting by the SABAP2 field counters.

Coordinated Avifaunal Road-count (CAR) data:
There are no CAR routes in the vicinity of the proposed project.

Coordinated Waterbird count (CWAC) data:
There are no CWAC sites in the vicinity of the proposed project.

- **Important Bird Areas (IBA's)**

Soutpansberg (SA003 / Global: ZA002):
This is an extremely large IBA of approximately 260 000ha in size, in compassing the Soutpansberg range of mountains. The Soutpansberg, an east–west trending mountain range, stretches some 130 km from 10 km west of Thohoyandou in the east to Vivo in the west. Louis Trichardt lies in the centre of the range, below its southern slopes. The range rises around 700 m from the surrounding plains to form various spectacular peaks. To the north, the plains drop into the lowveld of the Limpopo valley. The Soutpansberg supports a large colony of Cape Vultures, located on three separate adjacent cliffs. The colony holds approximately 116 – 171 breeding pairs. The thick forest vegetation in the valleys and basins supports a small population of Cape Parrot, as well as African Crowned Eagle, Forest Buzzard, Knysna Turaco, Chorister Robin-Chat, Narina Trogon, Olive Bush-shrike, Green Twinspot and Forest Canary, while the Protea woodland is suitable for Gurney's Sugarbird. The rivers hold small numbers of African Finfoot, White-backed Night Heron and Pel's Fishing-owl.

- **Personal observations**

Table 7.10 below, shows the sightings list of birds observed on site, during the two site visits (March and November 2012). Note that the table below is merely for indicative purposes, and this list represents incidental observations (which could be positively identified). Data from this table needs to be used with caution, as observations over such a short period cannot be taken as a true indication of the presence of all bird species in the area. In particular, the target species for this study are threatened, rare species, so the likelihood of seeing one during two three day periods is limited. This study has therefore attached far more weight to the secondary data sources such as the bird atlas project (Harrison et al, 1997) which collected data over a far longer period, and more diverse conditions. It must be noted that many "non Red Data" bird species also occur in the study area and could be impacted on by the power line. Although this impact assessment focuses on Red Data species, the impact on non Red Data species is also assessed, albeit in less detail. Furthermore, much of the mitigation recommended for Red Data species will also protect non Red Data species in the study area.

Table 7.10: Site visit observation list

No.	Common Name	No.	Common Name
1	Black-headed Heron	37	Common Fiscal
2	Cattle Egret	38	House Sparrow
3	Hamerkop	39	Cape Weaver
4	Marabou Stork	40	Yellow-billed Hornbill
5	Abdim's Stork	41	Red-billed Hornbill
6	Hadeda Ibis	42	White-browed Scrub Robin
7	Egyptian Goose	43	Speckled Mousebird
8	Yellow-billed Kite	44	Long-billed Crombec
9	Black-shouldered Kite	45	Spotted Flycatcher
10	Swainson's Spur-fowl	46	Paradise Flycatcher
11	Pied Crow	47	Whitebrowed Sparrow-weaver
12	Crested Guineafowl	48	Red-billed Buffalo Weaver
13	Helmeted Guineafowl	49	Red-billed Firefinch
14	Red-knobbed Coot	50	Blue Waxbill
15	Blacksmith Lapwing	51	Cape Vulture
16	Speckled Pigeon	52	Black-chested Snake-Eagle
17	Wahlberg's Eagle	53	Bar-throated Apalis
18	Cape Turtle Dove	54	Chinspot Batis
19	Amur Falcon	55	Paradise Flycatcher
20	Black-collared Barbet	56	Martial Eagle
21	Cardinal Woodpecker	57	Crimson-breasted Shrike
22	Long-tailed Wagtail	58	White-crested Helmet-shrike
23	Brubru	59	Red-faced Mousebird
24	Lesser-Grey Shrike	60	Black-backed Puffback
25	White-bellied Sunbird	61	Brown-hooded Kingfisher
26	Emerald Spotted Wood-Dove	62	Pygmy Kingfisher
27	Dark-Capped Bulbul	63	Forest Buzzard
28	African Stonechat	64	Jackal Buzzard
29	Grey-Go Away Bird	65	Spotted Flycatcher
30	Barn Swallow	66	Whitebrowed Scrub-robin
31	European Bee-eater	67	Red-capped Robin-chat
32	Swallow-tailed Bee-eater	68	Black-crowned Tchagra
33	Little Bee-eater	69	Cape Wagtail
34	European Roller	70	Scarlet-chested Sunbird
35	Lilac-breasted Roller	71	Black-collared Barbet
36	Fork-tailed Drongo		

Figure 7.29: Marabou Storks observed near to a small dam, close to the town of Louis Trichardt.

Figure 7.30: A group of crested Guinaefowl was observed in the Ben Lavin Nature Reserve.

- **Focal Species List**

Determining the focal species for this study, i.e. the most important species to be considered, is a four step process. Firstly, the micro-habitats available on site were identified. An analysis of the above existing avifaunal data represents the second step, i.e. which species occur historically in the area at significant abundances. The third step is to

identify those species (which may be present based on the above two steps), and are more likely to be impacted upon by the power-line and associated development. This step called on the vast experience of the EWT in evaluated and investigating electrical infrastructure impacts on birds (these impacts are discussed in more detail below). In general, large, heavy flying birds are more vulnerable to collision with over-head powerlines, while perching Raptors are more vulnerable to electrocution. The fourth and final step was to consider the species conservation status or other reasons for protecting the species. This involved primarily consulting the Red List bird species (Barnes 2000).

The resultant list of 'focal species' for this study is as follows: Cape Vulture, Martial Eagle, Southern-Ground Hornbill, Kori Bustard, Black Stork, African Crowned Eagle, Marabou Stork, Abdim's Stork and White Stork.

In many cases, these species serve as surrogates for other similar species (as mitigation will be effective for both), examples being Cape Vulture for White-backed Vulture, all the stroke species for Woolly-necked Stork, , as well as Martial Eagle for other large raptors such as Bateleur, Verreaux's Eagle, and African Fish Eagles. Assorted more common species will also be relevant to this study, but it is believed that the above target species will to a large extent serve as surrogates for these in terms of impact assessment and management.

7.3.9 Sites of Archaeological, Historical and Cultural Interest

The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age occupation, Iron Age occupation, as well as a much later colonial (farmer) component. A much smaller component is an urban one, which is actually expanding rapidly at present due to population increase and as well as people moving to economic centres in search of work.

Human occupation of the larger geographical region took place since Early Stone Age (ESA) times. This is evidenced by the scattered stone tools found in a secondary context (open surface material), where they have been exposed in gravel terraces by rivers and streams as well as areas of sheet erosion. Normally this material is viewed to have a low significance and the localities where they are found are referred to as find spots rather than sites.

During the Middle Stone Age (MSA) human population in the region increased dramatically as is evidenced by the large number of finds pots in the larger region. This was the result of people becoming more mobile, occupying areas formerly avoided. According to Thackeray (1992) the MSA is a period that still remains somewhat murky, as much of the MSA lies beyond the limits of conventional radiocarbon dating. However, the concept of the MSA remains useful as a means of identifying a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct

from the core tool-based ESA technology. In the larger region, Mason (1962) has identified a variant of the MSA that became known as the Pietersburg Culture.

Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the region, on their seasonal migration. As a result, tools belonging to this period also mostly occur in the open or in erosion dongas. Similar to the ESA material, artefacts from these surface collections are viewed not to be in a primary context and have little or no significance.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Also, for the first time we now get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA.

LSA people preferred, though not exclusively, to occupy rock shelters and caves and it is this type of sealed context that make it possible for us to learn much more about them than is the case with earlier periods. They have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes. During an extensive survey, Eastwood & Cnoops (1994) identified a number of sites containing rock art in the western section of the Soutpansberg.

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Silver Leaves, south east of Tzaneen dating to AD 270. Closer to the study area, dates of AD 430 and 415 have been obtained from sites at Klein Afrika and Happy Rest (near Schoemansdal (Prinsloo 1974). Other sites, more to the west, yielded dates centring around c. AD 800 (Van Schalkwyk 1998, 2004).

The occupation of the larger geographical area (including the study area) intensified after the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable. Population movements, competition for resources, etc. created tensions amongst different groups and people were forced to congregate into large towns for defensive purposes. These stone-walled villages were almost always located near cultivatable soil and a source of water.

Shona-speaking chiefdoms moved from Zimbabwe to settle south of the Limpopo river from about AD 1400. Here they incorporated earlier Sotho-speakers and, after more than 100 years, this gave rise to the Venda language. By about AD 1690 the Singo, who was part of the Rozwi in Zimbabwe, entered the area and conquered most of the Venda (Huffman 2005).

Whites moved into the area, first as hunters, traders and missionaries, with settlers following closely on their heels. One of the first white settlements was located and Shoemansdal to the west of Makhado (Louis Trichardt). Over time, farms were surveyed

and new towns were laid out. Few settled on the northern side of the mountain, possibly because of the isolation, malaria and hostile Venda-speakers. It was only after the beginning of the 20th century that whites started to occupy the area on a permanent basis. From early maps (**Figures 7.31 & 7.32**) it can be deduced that the area was sparsely populated and under developed in early historic times.

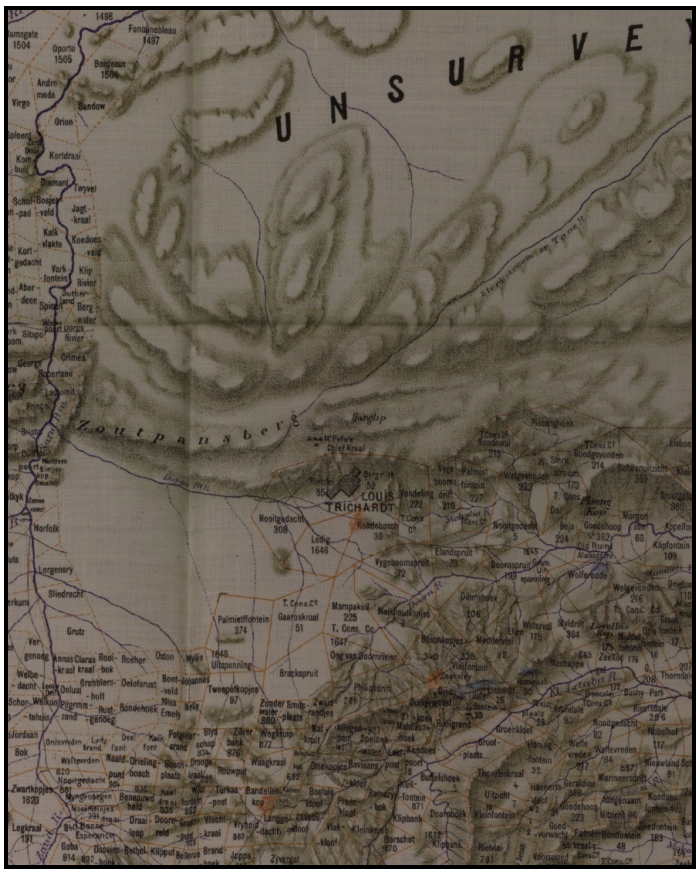
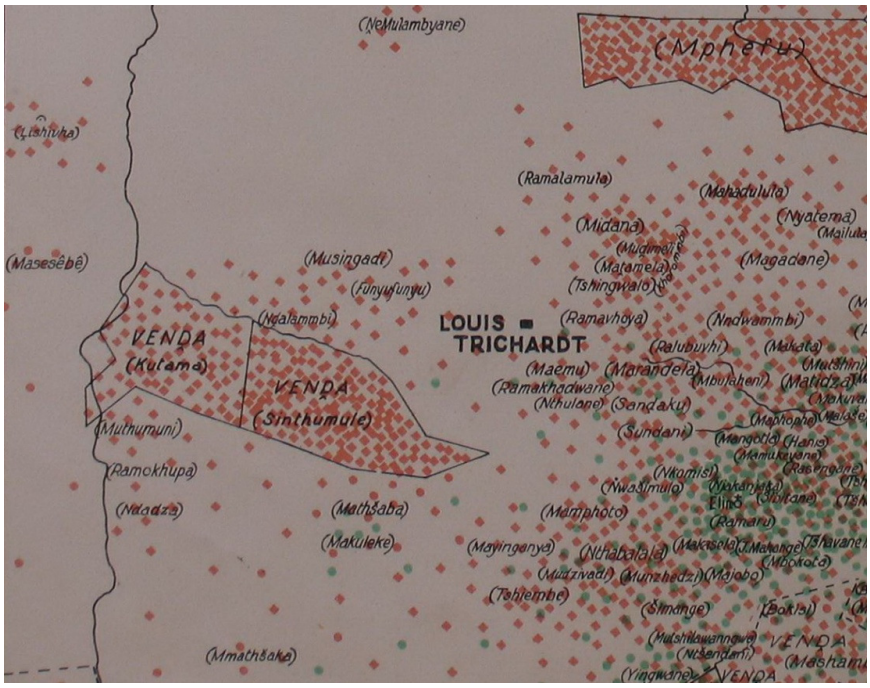


Figure 7.31: The state of cadastral and geographical information of the study region in 1899. (Map: Jeppe 1899)


(NeMulambyane)
(Mphefu)
(Ramalamula)
(Mahadulula)
(Nyatema)
(Midana)
(Magadane)
(Masesêbê)
(Musingadi)
(Funyufunyu)
(Ndalammbi)
LOUIS
TRICHARDT
(Ramavhoya)
(Nadwammbi)
VENDA
(Kutama)
VENDA
(Sinthumule)
(Ralubuyhi)
(Maemu)
(Marandela)
(Mbulaheni)
(Ramakhadwane)
(Nthulane)
(Sandaku)
(Sundani)
(Muthumuni)
(Ramokhupa)
(Ndadza)
(Mathšaba)
(Makuleke)
(Mamphoto)
(Mayinganya)
(Nthabalala)
(Tshiembe)
(Mmathšaka)
VENDA

```
ERROR: stackunderflow
OFFENDING COMMAND: ~

STACK:
```