Botanical Assessment: Proposed residential development 'Uitkoms' at Kathu, Northern Cape Province

Botanical Surveys & Tours

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Prepared for EnviroAfrica CC

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National Legislation and Regulations governing this report

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC to provide specialist botanical consulting services for the assessment of impacts of the proposed residential development at Portion 1 of Uitkoms 463, Kathu, Northern Cape Province.

Details of Specialist

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Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 30 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 300 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the survey was carried out under the aegis of, Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald nor Bergwind Botanical Surveys and Tours CC have any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Bergwind Botanical Surveys & Tours CC, its staff and appointed associates, reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation

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Note: Aerial photo images based on Google Earth ™ in this report are used under a valid Google Earth Pro licence.

DECLARATION

This botanical assessment was conducted by Dr David J. McDonald BSc. Hons. (Botany), MSc (Botany) and PhD (Botany), a botanical ecologist with over 30 years' experience in the field of Vegetation Science. I am registered as an Ecological Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration No. 400094/06.

Curriculum Vitae – See Appendix 2.

THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I David Jury McDonald, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Note: The terms of reference must be attached.

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

14 July 2015

CONTENTS

1. Introduction

Bergwind Botanical Surveys & Tours CC was commissioned by EnviroAfrica CC to conduct a botanical assessment for the Kumba Housing Project at Kathu, Gamagara Local Municipality, Northern Cape Province. Kathu is expanding rapidly due to mining operations in the area and there is an urgent need for more housing. Two areas have been earmarked for development, at Uitkoms and SIMS (Figure 1) and this report deals with the western area known as the Uitkoms Residential Expansion Area.

The principles, guidelines and recommendations of CapeNature [Western Cape] (although the study is in the Northern Cape Province) and the Botanical Society of South Africa for proactive assessment of the biodiversity of proposed development sites are followed (Brownlie, 2005). The requirements of the Department of Environment and Nature Conservation, Northern Cape Province, are also taken into account.

2. Terms of Reference

Terms of reference for the botanical assessment:

- Undertake the requisite field work and compile a report that considers the following:
  - The local and regional context of the vegetation communities within the affected areas, taking the relevant biodiversity plans and bioregional planning documents into consideration;
  - The vegetation communities occurring on the proposed development site;
  - The status and conservation value of the vegetation communities;
  - Any species of special concern (rare or endangered species), endemic to the area or threatened species encountered or likely to be present;
  - Investigate ecological / biodiversity processes that could be affected (positively and/or negatively) by the proposed project.
  - Evaluate and assess the impact the development will have on ecological corridor functioning (patterns & processes) and ecological management of fire

3. Study Area

3.1 General location and history

Kathu is located in the Northern Cape Province towards the southern extremity of the Kalahari, a semi-arid to arid sandy area extending from Angola in the north through the

eastern parts of Namibia, Botswana and western Zimbabwe into South Africa. The climate and geology (see below) have a profound effect on the vegetation and distribution of plant communities in the Kalahari.

Development of the town of Kathu started in the early 1970's in and around the Kathu Bush, a unique and extensive 'forest' community dominated by *Acacia erioloba* trees. This is somewhat remarkable since Kathu was declared a State Forest in 1920, de-proclaimed in 1956, listed in NACOR in 1978 and in 1995 was recognized as a Natural Heritage Site. This points to the special nature of the Kathu Bush. Much emphasis is now placed in conservation circles on the importance of the *Acacia erioloba* woodlands of Kathu Bush and most if not all developments around Kathu are under scrutiny to ensure that the unique, protected trees are not harmed (Van Rooyen, 2006).

3.2 Specific location

The proposed Uitkoms Residential Area is located on the north-east side edge of the town of Kathu (Figures 1 & 2) on the property Portion 1 of Uitkoms 463, Kathu (henceforth referred to as Uitkoms).The total area of the site is 97 ha and it lies north of Frikkie Meyer Street and immediately west of the N14.

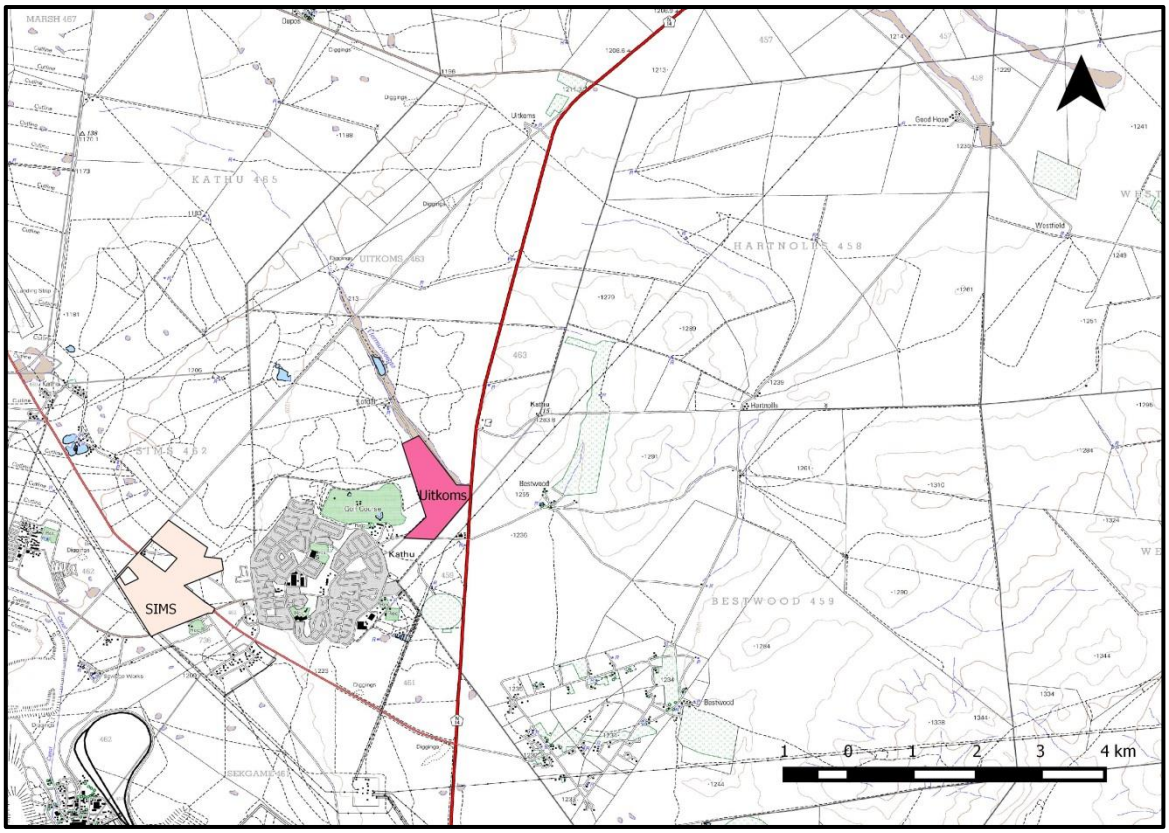


Figure 1. Location of Portion 1 of Uitkoms 463, Kathu (pink area) on the northeast side of the town of Kathu, Northern Cape Province.

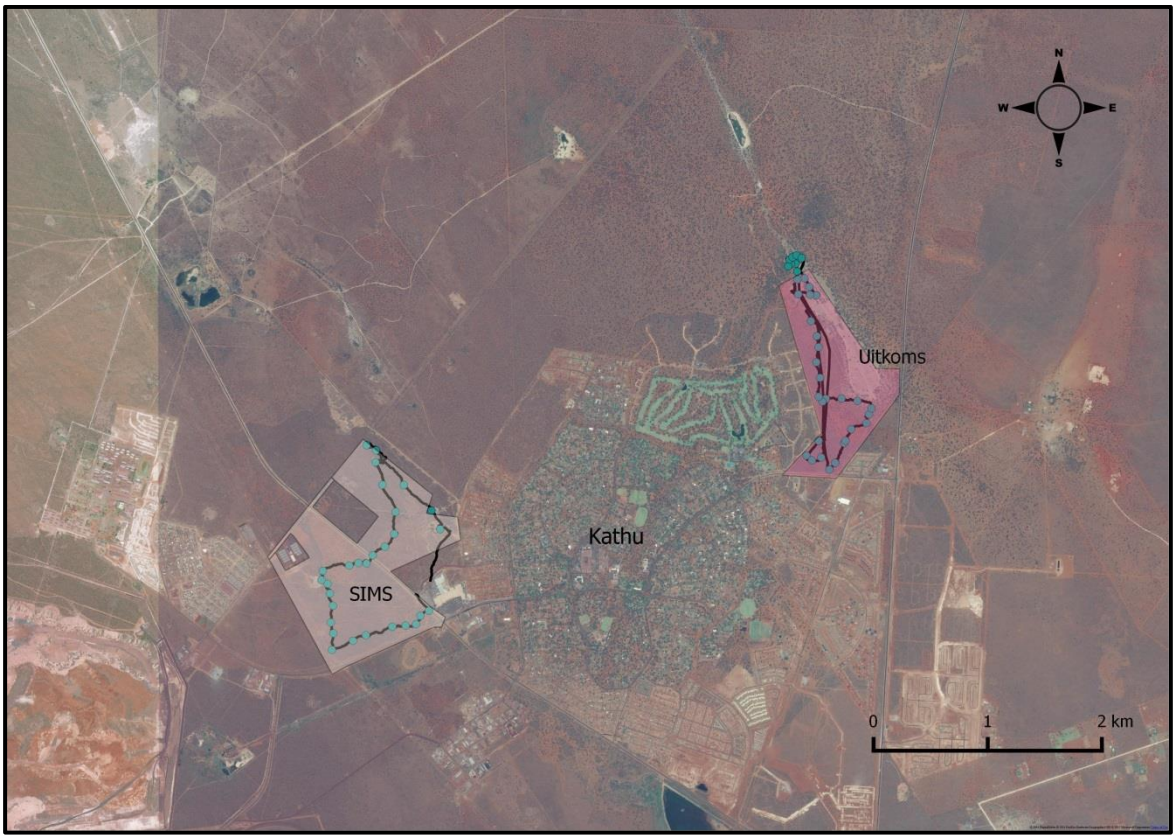


Figure 2. Aerial image (from Bing ™) showing the location of Uitkoms near to the Kathu Country Club on the northeast side of Kathu.

3.3 Geology and Soils

A characteristic of the Kalahari is the red sand of what is now considered to be a fossil desert. This sand is of aeolian origin (Gordonia Formation, Kalahari Group) and forms shallow to deep sandy to sandy loam soils. There are few moving dunes as in the Namib Desert and the soil is mostly vegetated. The red sand is often underlain by calcrete of Tertiary to Recent age which in turn overlies andesitic or basaltic lava of the Ventersdorp Group (Visser, 2006). At Uitkoms the sandy overburden is deep enough to cover the calcrete. The soils at Uitkoms are generally described as red and yellow well-drained sandy soils with high base status (Figure 3).

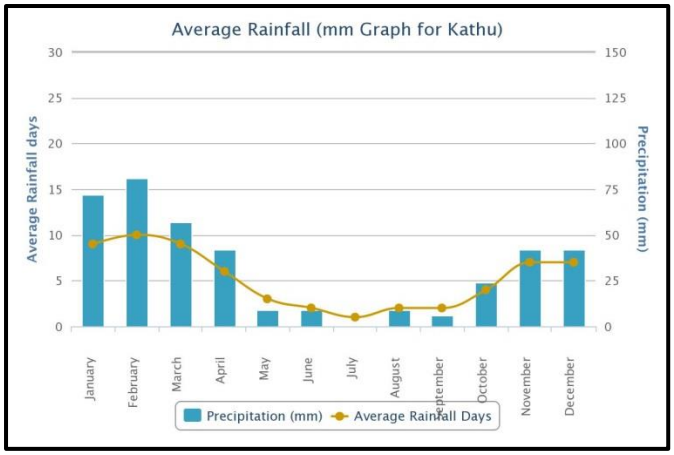
Figure 3. Characteristic red sandy soil with grassy shrubland vegetation found at Uitkoms

3.4 Topography

The study area is located at 1235 m a.m.s.l. and is relatively flat. Elevation does not vary much over the whole site and there is almost no relief which is characteristic of the wide plain where Kathu is found. Aspect therefore does not have an influence on the vegetation.

3.5 Climate

Kathu experiences summer rainfall with most rain falling from November to April. Rainfall is highly unpredictable and averages around 418 mm *per annum* with a range of 156 to 1088 mm depending on the cycle. This rain usually falls as a result of thunderstorms when tropical thunderstorm activity extends southwards over the Kalahari (Figure 4A). Summer temperatures can reach 40 ºC (average 16 – 30 ºC) whereas the dry winters are mild to cold. Winter daytime temperatures can reach 25 ºC but at night frost can occur and temperatures can average below 0 ºC (Van Rooyen, 2006) (Figure 4B). A climate diagram for Kathu Bushveld is given in Figure 5.



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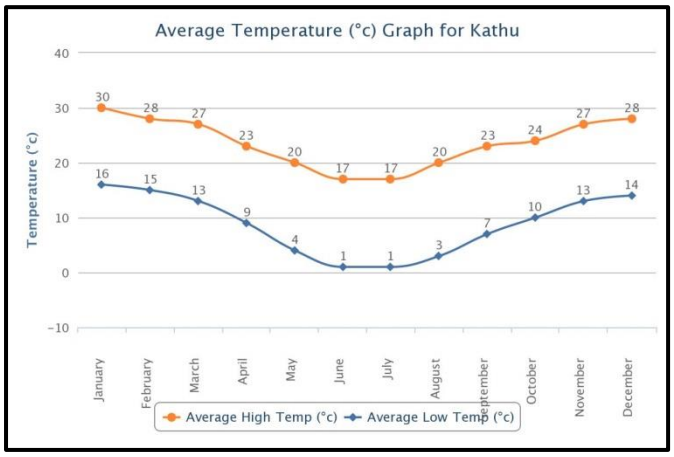

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Figure 4A. Average rainfall and **4B**. Average temperatures for Kathu (Source: www.worldweatheronline.com)

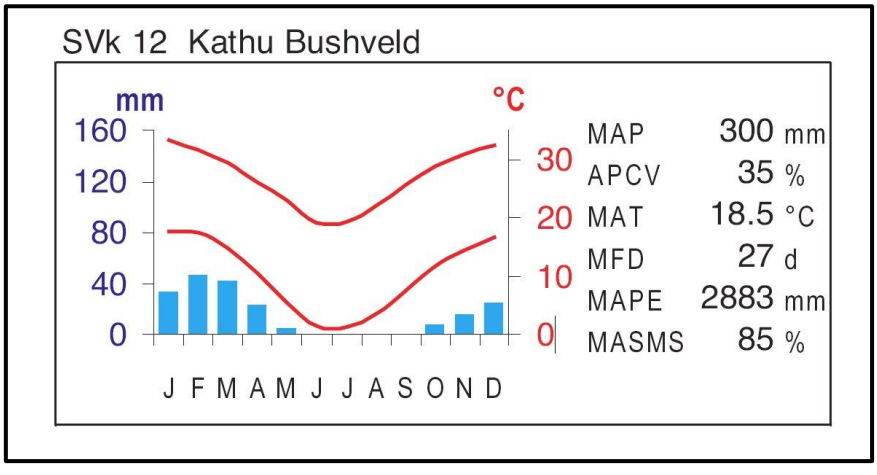


Figure 5. Climate diagram for Kathu Bushveld (from Mucina *et al.,* 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress

4. Evaluation Method

The Uitkoms study area (Figure 6) was visited on 12 March 2014 to conduct the required botanical survey. Standard methods of evaluation were used. A hand-held Garmin ® GPSMap 62s was used to record 'sample' waypoints and the 'sample track'. At the 'sample waypoints' specific details of the surrounding vegetation and features of habitat were recorded and photographs taken to support the general observations made on the site. No attempt was made to cover the whole property but sampling was focused so as to obtain the best overall understanding of landscape and biodiversity conditions on the site.

5. Limitations and assumptions

The survey of the Uitkoms study site was undertaken in the late summer which was the ideal time since good rains had been experienced prior to the site visit and the vegetation was in good condition. Season therefore did not impose any limitations on the survey. A fire had occurred over parts of the study site in the previous winter but many of the shrubs were coppicing vigorously and the grasses were strongly stimulated by the fire so this in no way negatively influenced the survey.

No other obstacles or limitations were encountered.

6. Vegetation Classification and Conservation Status

The vegetation map of South Africa, Lesotho and Swaziland (Mucina, Rutherford & Powrie, 2005 and updated in 2009) indicates that the entire area of the SIMS study site falls within the widespread vegetation type known as Kathu Bushveld, a Least Threatened vegetation type (Government Gazette, 2011; Driver *et al.* 2011)

Kathu Bushveld is a vegetation type within the Savannah Biome, Eastern Kalahari Bushveld Bioregion, of southern Africa. According to Rutherford *et al.* 2006 it extends from Kathu and Dibeng in the south to through Hotazel to Frylinckspan near the Botswana border at an altitudinal range of 960 – 1 300 m above mean sea level. Depending on location it may have a stratum of tall trees, usually *Acacia erioloba* (camel thorn), or there may be a stratum of small trees most often dominated by *Acacia mellifera* subsp. *detinens*. *Boscia albitrunca* (Shepherds' tree) and *Terminalia sericea* (silver cluster-leaf) also contribute to the small tree stratum in places. A third stratum of tall shrubs is usually found and is the most prominent stratum with a fourth stratum also present consisting of low shrubs, grasses and forbs usually less than 1 m tall.

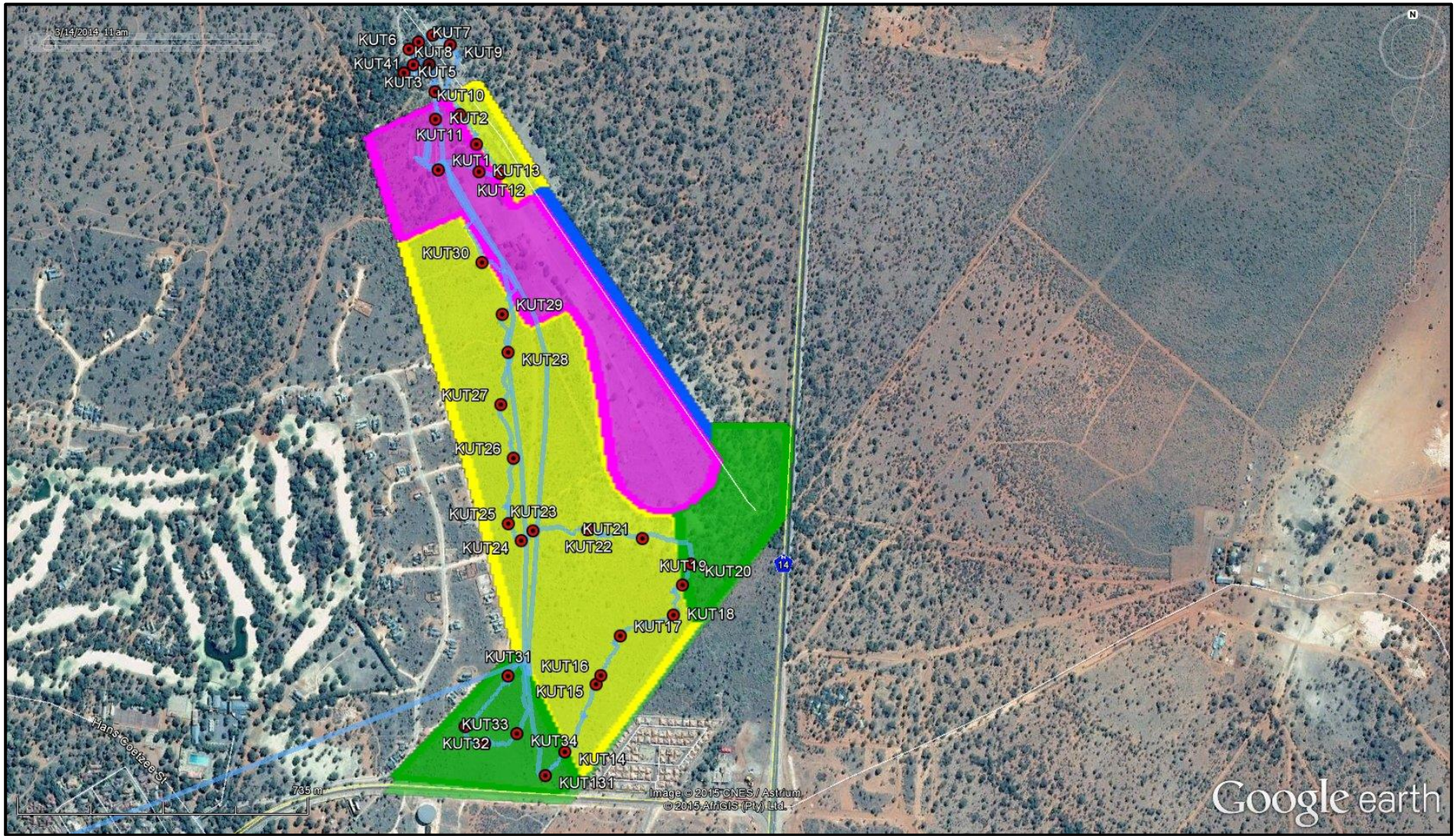


Figure 6. Aerial image (Google Earth ™) with Portion 1 of Uitkoms 463. Kathu. The yellow areas are areas original considered for housing, the pink area is horse-riding infrastructure and the green areas were proposed as conservation areas. The 'sample track' is shown in blue with waypoints with red dots KUT#.

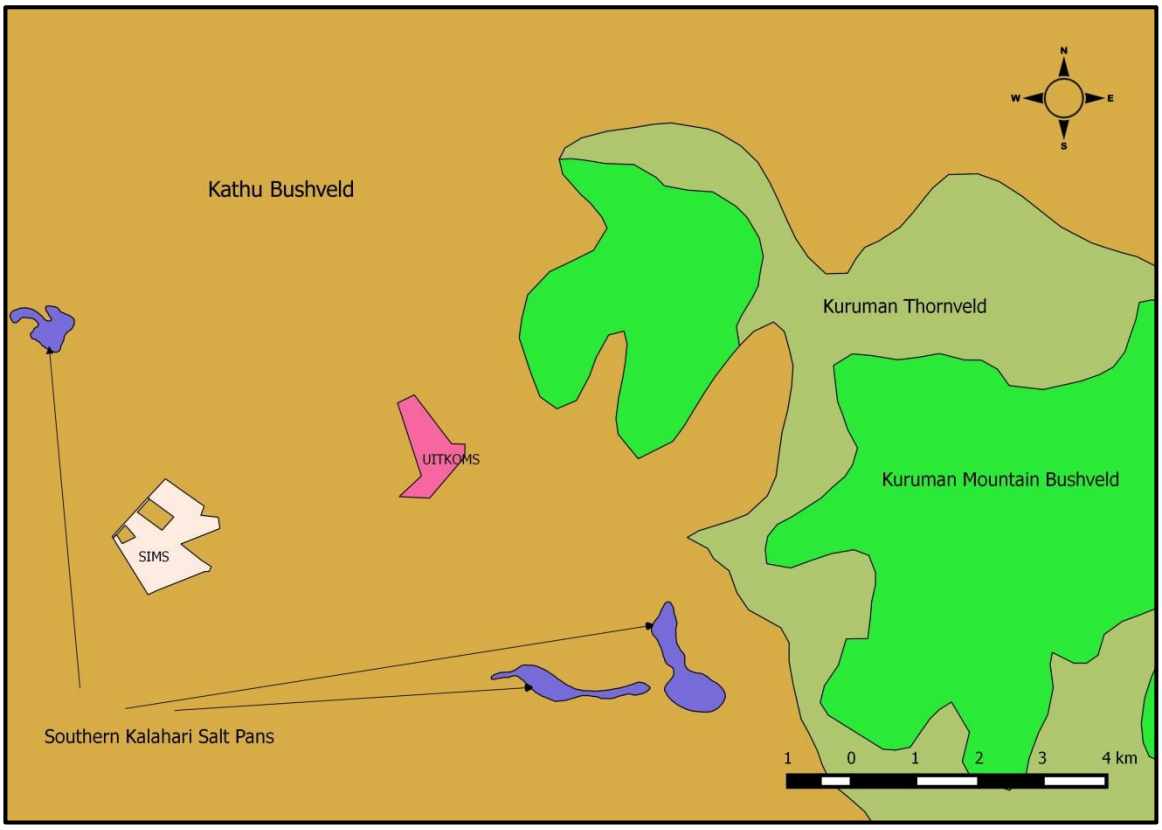


Figure 7. Portion of the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina *et al.*, 2005 and updated in 2009) showing the location of the study site (Uitkoms) in Kathu Bushveld (light brown).

7. Site investigation

7.1 Existing infrastructure

Approximately one-third of the Uitkoms site has already been developed for horse-riding and horse-racing. Around the stables and along the perimeter of the race-track some of the large *Acacia erioloba* (camel thorn) trees have been kept whereas the shrubby vegetation has been removed. Although samples were taken north of the stables and racetrack for the sake of completeness, the proposed residential development was not envisaged for this area.

Figure 8. Mature *Acacia erioloba*[1] (camel thorn) trees near the stables.

Figure 9. Mature *A. erioloba* (camelthorn) trees in the northern sector of the Uitkoms site.

[1] The name *Acacia erioloba* is used in preference to the recently applied name *Vachelia erioloba*.

Figure 10. Young *Acacia erioloba* (camelthorn) and *Acacia karoo* (sweet-thorn) trees near the horse-racing track.

7.2 Undeveloped areas

Since Kathu Bushveld has been well described and is an extensive Least Threatened vegetation type, the main focus of the site investigation was to determine the location of protected trees, mainly *Acacia erioloba* and, if present, *Boscia albitrunca*. A second objective was to determine if there were any special habitats present in the undeveloped parts of the Uitkoms site. The third objective was to examine the proposed layouts of the housing development to advise on changes that should be made to avoid sensitive habitats and / or protected trees (as far as possible) within the study area.

7.3 The Vegetation found at the Sample Waypoints

Sample waypoints KUT1 – KUT13 (Figure 6) are located fairly closely together in the northeastern sector of the site and some outside the designated site. The vegetation encountered is typical Kathu Bushveld with a medium-high to tall tree stratum consisting mainly of *Acacia erioloba* and *Ziziphus mucronata* (blinkblaar wag-'n-bietjie) and a mid-high stratum of shrubs with *Grewia flava* prominent. The field-stratum is dominated by grasses and forbs. No emphasis is placed on this area since there is no intention to develop this part of the site.

More emphasis is placed on the southern and western sectors of the site, south and west of the horse-racing track. For this purpose the waypoints with a short description of the sample site characteristics and illustrations are given in Table 1.

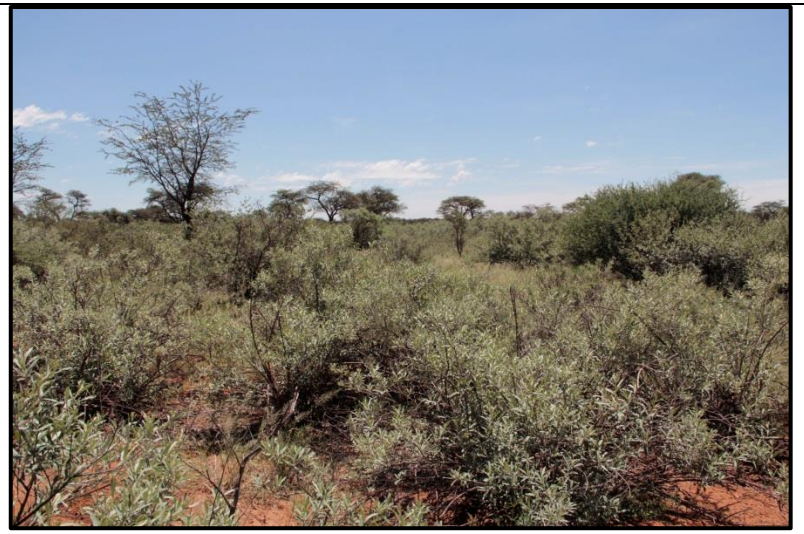
Table 1

Waypoint	Co-ordinates	Brief Descriptive Notes	Illustration
KUT131	S 27° 41′ 25.2″ E 23° 04′ 01.8″	This waypoint is located near the main entrance to the site. There is significant disturbance in this area. A single young camelthorn tree (*A. erioloba*) is found near this waypoint. More of these trees of small to medium size are found east of this waypoint. The soil is red clay-loam and the field stratum is dominated by *Elephantorrhiza elephantina and grasses.* Other species recorded include, *Aristida* cf. *diffusa, Boophone disticha,* Cucurbitaceae (genus uncertain), *Felicia* sp., *Geigeria ornativa, Grewia flava,* Lamiaceae – creeping, *Melinis* sp., *Senna italica* subsp. *arachoides*), *Setaria* sp. and *Tarchonanthus camphoratus.*	  *Senna italica* subsp. *arachoides*

			 *Geigeria ornativa*
KUT14	S 27° 41’ 23.2 E 23° 04 03.6	At a power line servitude with a gravel ‘management road’ that runs parallel to the power line. *Boophone disticha*) [gifbol] is abundant in this area, notably west of the power line. It would be important to conserve the area west of the power line. East of the power line is the same open grassland as west of the power line but with thickets of *Tarchonanthus camphoratus.* Other non-graminoid species recorded include *Peliostomum leucorrhizum*, *Hermannia* sp and *Grewia flava*. If the area east of the power line is developed, search and rescue of *Boophone disticha* as well as other geophytes would be necessary	

			 *Boophone disticha* (Gifbol)
KUT15	S 27° 41′ 17.7″ E 23° 04′ 06.5″	At waypoint KUT15 there are mid-high thickets of *Tarchonanthus camphoratus* with areas of open grassveld on red sandy-loam soils. *Boophone disticha* is common. The soils are shallow over calcrete and scattered small *Acacia erioloba* plants are present. The soils are most likely too shallow for *Acacia erioloba* to develop into big trees.	

KUT16	S 27° 41’ 17.0” E 23° 04’ 06.9”	At waypoint KUT16 (S 27° 41’ 17.0” E 23° 04’ 06.9”) the vegetation is the same as that at waypoint KUT15 but with signs of a recent fire. The burnt saplings of *Acacia erioloba* were resprouting from the base (rootstock) as were the *Tarchonanthus camphoratus* shrubs.	
KUT17	S 27° 41’ 13.7” E 23° 04’ 08.7”	In burnt area. Vegetation the same as at KUT15 and KUT16. Abundant geophytes in red sandy-loam soil.	

KUT 18	S 27° 41’ 12.0” E 23°04’ 13.6”	Cluster of fairly large *Acacia erioloba* trees with and understorey of *Tarchonanthus camphoratus* and *Acacia mellifera* var. *detinens* (blackthorn), forbs and grasses. The last fire did not penetrate into this area.	
KUT 19	S 27° 41’ 09.6” E 23° 04’ 14.4”	*Tarchonanthus camphoratus* thicket with grass field stratum.	

KUT 20	S 27° 41’ 07.8” E 23° 04’ 15.2”	At a track south of the horse-racetrack. A number of very large *Acacia erioloba* (camelthorn) trees are found west and east of the track.	
KUT 21	S 27° 41’ 05.8” E 23° 04’ 10.7”	Cluster of medium to large *Acacia erioloba* (camelthorn) trees with *Acacia mellifera* var. *detinens* (blackthorn) and *Tarchonanthus camphoratus* forming a shrub stratum above the grassy field layer. This area was not burnt in the last fire.	

KUT 22	S 27° 41’ 05.1” E 23° 04’ 05.1”	This area was burnt in the last fire. From aerial photographs it appears that there is a ‘belt’ of *Acacia erioloba* possibly associated with deeper soil although observations suggest that the soil is shallow sandy loam over calcrete. The understorey is a mid-high stratum of *Tarchonanthus camphoratus* with a low stratum of grasses and forbs. The shrubs and forbs and medium-sized *Acacia erioloba* trees were burnt in the fire. The top growth of the *Acacia erioloba* plants was killed in the fire but the trees were resprouting from the base (see opposite). This area does not appear to be botanically sensitive with scattered *Acacia erioloba* of small size.	 

KUT 23	S 27° 41′ 05.1″ E 23° 04′ 00.6″	Alongside the main road to the stables. The area to the east of the road was burnt and the vegetation is now recovering. Many shrubs, forbs and *Acacia erioloba* were resprouting at the time of the survey. (Note blackened trees killed by fire in the illustration)	
KUT24	S 27° 41′ 06.0″ E 23° 03′ 59.5″	A large, well-developed *Acacia erioloba* (camelthorn) tree immediately alongside the road on the west side. It has an understorey of *Acacia mellifera* var. *detinens*, *Ziziphus mucronata*, *Searsia* sp. and *Asparagus* sp.	

KUT25	S 27° 41’ 04.6” E 23° 03’ 58.3”	At a disturbed track with a water pipeline. The vegetation is mid-high *Tarchonanthus camphoratus* shrubland with grassland understorey. Scattered, small *Acacia erioloba* plants are found here.	
KUT 26	S 27° 40’ 59.2” E 23° 03’ 58.8”	The soil in this area is shallow red sandy-loam over calcrete. The vegetation is dominated by *Tarchonanthus camphoratus* and *Grewia flava* is present. Small *Acacia erioloba* saplings are present. This area did not burn in the last fire.	

KUT 27	S 27° 40′ 54.8″ E 23° 03′ 57.6″	This waypoint is at a large, well-developed *Acacia erioloba* tree – one of a number in this area. The understorey is typically dominated by *Tarchonanthus camphoratus*.	
KUT 28	S 27° 40′ 50.5″ E 23° 03′ 58.3″	This area is dominated by *Acacia mellifera* var. *detinens* (blackthorn). It has a low field stratum dominated by forbs and low shrubs such as *Chrysocoma ciliata* (bitterbos) that is abundant. Grasses are present but not common.	

KUT 29	S 27° 40′ 47.4″ E 23° 03′ 57.7″	This waypoints is in the area south of the stables and near the racetrack. *Acacia mellifera* var. *detinens* (blackthorn) has been cleared and the area is grassy but with abundant *Chrysocoma ciliata*. It appears to have been grazed significantly, probably by horses.	
KUT 30	S 27° 40′ 43.2″ E 23° 03′ 55.9″	At a well-developed *Acacia erioloba* tree along the power line that feed the racetrack buildings. North of this location to the stables the area is disturbed due to grazing by horses. The vegetation is a mosaic of shrubby area (thicket) and open grassy areas.	

KUT 31	S 27° 41’ 17.0” E 23° 03’ 58.3”	This waypoint is in the ‘conservation area’ west of the main road near the entrance. This area is similar ‘bushveld’ to area west of Kathu with scattered *Acacia mellifera* var. *detinens*, *Grewia flava* and interestingly *Acacia haematoxylon* (grey camelthorn) – a species typical of the Kalahari. (Note: This area is important from an archaeological perspective and is thus earmarked for conservation).	
KUT 32	S 27° 41’ 21.2” E 23° 03’ 54.4”	This waypoint is at the west corner of the ‘conservation area’. There is a concentration of young *Acacia erioloba* in this area. In addition there are also numerous plants of *Boophone disticha*. At the time of the survey the grass sward was lush and dense.	

KUT 33	S 27° 41’ 22.6” E 23° 03’ 56.2”	This waypoint is located in the ‘central’ part of the conservation area. The grass is lush and cover is mid-dense to dense. Shrubs are sparse with a few *Acacia mellifera* var. *detinens* present. The soil is sandy-clay-loam with banded ironstone stones and rocks. The area has a high concentration of Stone Age tools.	
KUT 34	S 27° 41’ 21.7” E 23° 03’ 59.2”	Very shallow soil with banded ironstone at the surface. The vegetation is mainly open grassveld with a few scattered *Acacia mellifera* var. *detinens*.	

7.4 Comments about the vegetation

Observations during the field investigation at the Uitkoms study site verified the classification of the vegetation as Kathu Bushveld and revealed that this area is a mosaic of open grassland with thickets dominated by *Tarchonanthus camphoratus* and scattered or clustered camel thorn trees (*Acacia erioloba*) of varying age. The vegetation is not forest-like.

The vegetation is Least Threatened and does not harbour any endemic species. However, as noted above, *Acacia erioloba* (camel thorn) trees are scattered over the site and where possible these trees should be preserved. Where removal of the camel thorn trees would be necessary, a permit would be required from the Department of Agriculture Fisheries and Forestry, since these trees are protected under the National Forests Act, 1998 (Act No. 84 of 1998).

8. Development layouts

Two development layouts are assessed. Alternative 1 (Figure 11a) was developed to include residences covering most of the western area of the Uitkoms site as well as the southern area south of the racetrack but avoiding the conservation area i.e. the area west of the Eskom power line. This layout would impact Kathu Bushveld some of which is in fair to good condition in the south and south-west but some which is in poor condition in the area nearer the stables i.e. the areas represented by waypoints KUT29 and KUT30. The Alternative 2 layout (Figure 11b) which is the preferred alternative would also impact the areas south and south-west of the racetrack but would not impact the impact area west of the racetrack. In both alternatives the conservation area in the southwest corner of the site would be retained but the originally suggested conservation area in the southeast corner (see Figure 6) would be lost.

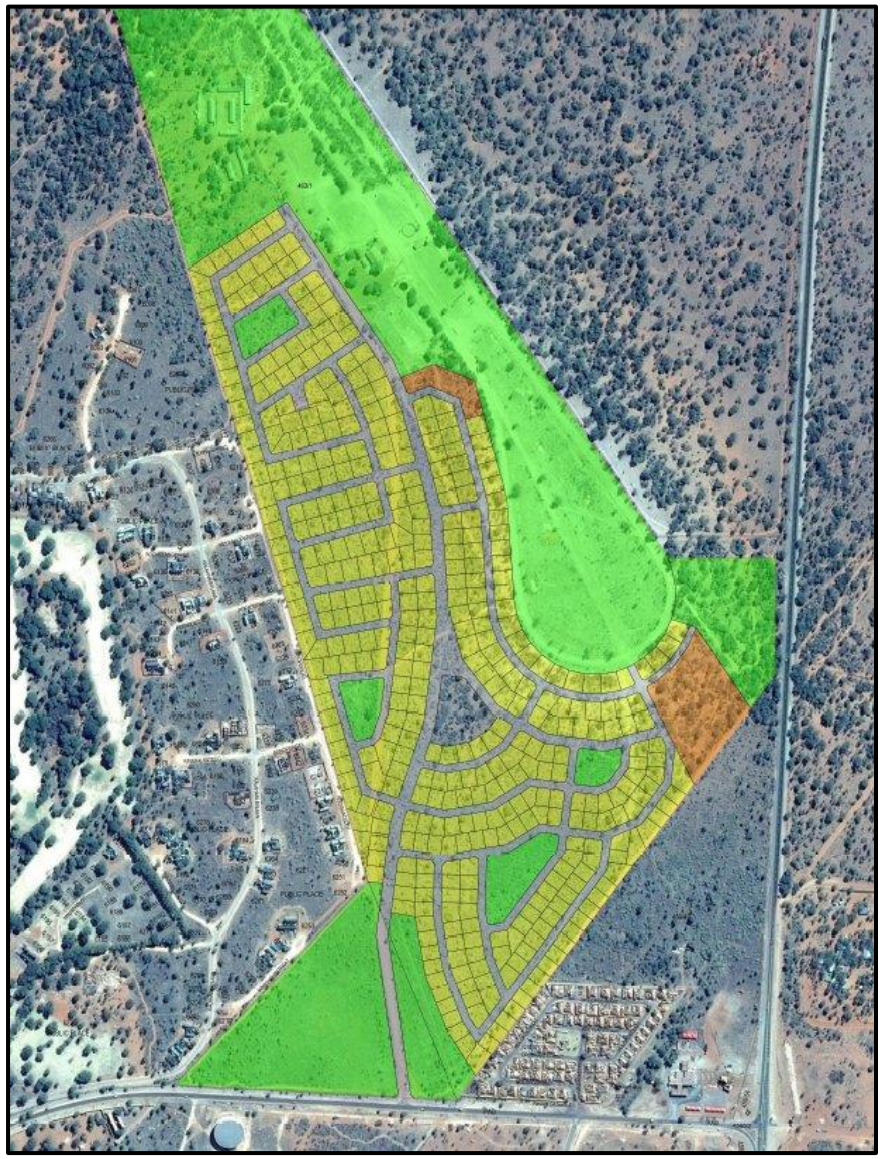


Figure 11a. Development Alternative 1

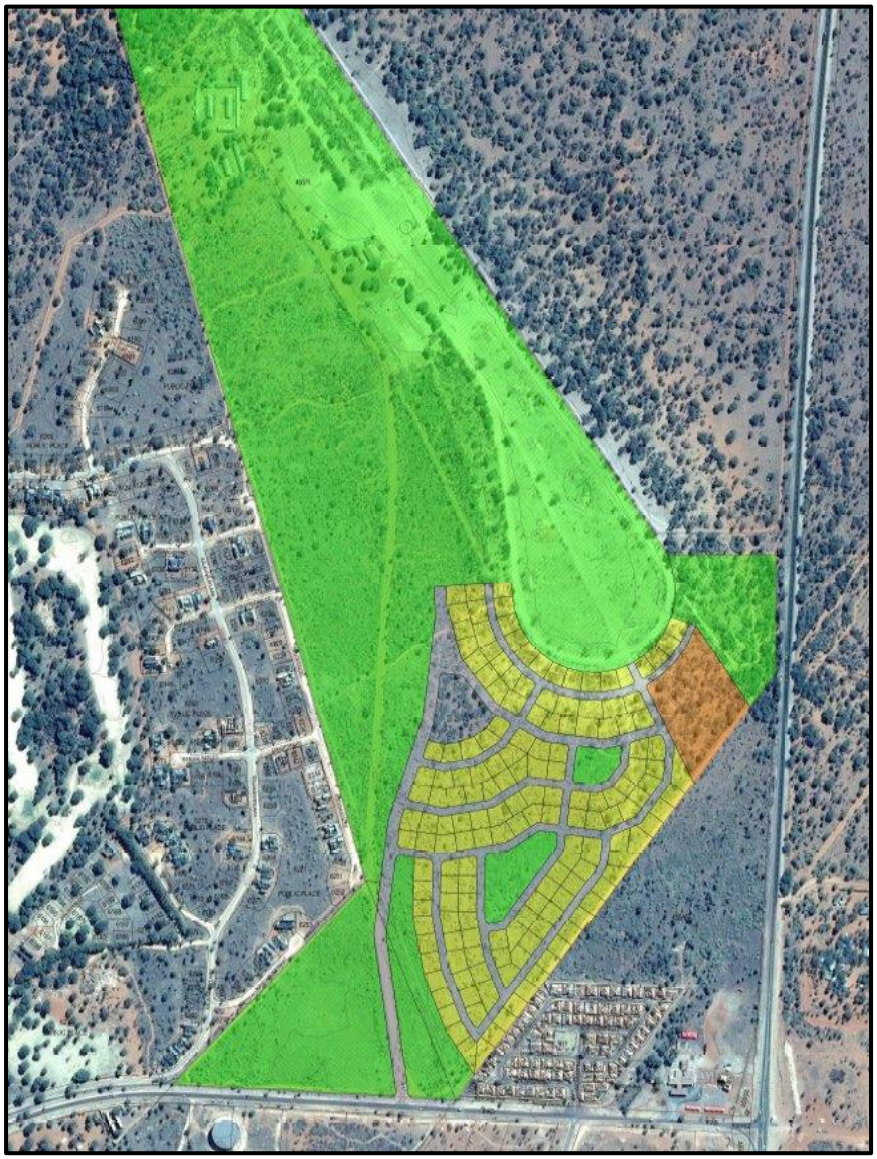


Figure 11b. Development Alternative 2

9. Impact Assessment

9.1 Assessed impacts

Impacts on the vegetation are assessed for the 'No Go' Alternative and two development alternatives for the proposed Uitkoms residential development at Kathu.

In the case of the **'No Go' option** the residential development would not be pursued and the *status quo* would persist. The vegetation would remain much as it is. The No-Go alternative would result in a **Low negative** impact; it cannot be **Neutral** because there is a low to medium level of negative impact due to the equestrian use of the property and the grazing of horses.

Three types of impacts are assessed:

- **Direct impacts:** Impacts occurring directly on the vegetation of the site as a result of the proposed development.
- **Indirect impacts:** Impacts that are not a direct result of the proposed activity (in this case the housing development) but occur away from the original source of impact.
- **Cumulative impacts:** impacts caused by several similar projects within the same vegetation type.

Various approaches can be adopted to assess impacts but most of them have similar elements and thus a system with the simplest approach has been followed here (see table in Appendix 1)

When determining the individual impacts against the various criteria, the element of mitigation, where relevant, was also brought into the assessment.

9.2 Direct Impacts

The impacts on the vegetation and habitat for the proposed housing development at Uitkoms, Kathu are considered according for two identified potential impacts that are:

- Loss of vegetation type and habitat including plant species due to construction and operational activities.

- Loss of ecological processes found within the original or currently existing habitat

9.2.1 Loss of Kathu Bushveld and habitat including plant species due to construction and operational activities at Uitkoms

A distinction must be made between direct impacts at a local scale and those at a regional scale. At the local scale of the Uitkoms site, the impact would be restricted to the area south and west of the racetrack and main entrance road. Not all the vegetation would be removed and many of the *Acacia erioloba* (camelthorn) trees would remain although some would be lost. The result would be a **High negative** impact at a local scale for both Alternative 1 and Alternative 2 (Table 3) both during the construction and operational phases although Alternative 2, the preferred alternative would be have a lesser impact overall because it would affect a smaller area of the site. Regionally, however, the impact of either alternative would be **Low negative** (see Cumulative impacts below).

It is important to note therefore that Alternative 2 (preferred) would be the most desirable option despite the fact that in the area where it would affect the vegetation it would have a High Negative impact.

Table 3. Impact and Significance – Loss of Kathu Bushveld and associated habitat due to the 'No Go' alternative and construction alternatives (including operational phase) of the proposed housing development at Uitkoms, Kathu.

Actions	Alternative	Impact	Extent	Duration	Magnitude	Significance	Status	Probability of occurrence	Confidence
	"No Go"	Kathu Bushveld	Small (Local)	Long term	Low	Low	-ve	Unlikely	High
Without mitigation	Alt 1	Kathu Bushveld	Small (local)	Long-term	High	High	-ve	Probable	High
With mitigation	Alt 1	Kathu Bushveld	Small (local)	Long-term	High	High	-ve	Probable	High
Without mitigation	Alt 2 (preferred)	Kathu Bushveld	Small (local)	Long-term	High	High	-ve	Probable	High
With mitigation	Alt 2 (preferred)	Kathu Bushveld	Small (local)	Long-term	High	High	-ve	Probable	High

Mitigation

The first important mitigation measure would be to attempt to design the final layouts of the residential area at Uitkoms to cater for the loss of as few *Acacia erioloba* (camelthorn) trees as possible. In addition it would be important to advise the architects of the houses that they should take these trees into consideration when planning houses for each individual erf. Further mitigation in this respect would be to plant Acacia erioloba trees in the green open spaces to offset any trees that would be lost during construction.

Boophone disticha (gifbol) is not an uncommon geophyte and not a threatened species but there is a high concentration of this species in the areas where the residential development is planned. It is therefore recommended that these plants that are easily identified should be located, rescued and replanted in areas of similar habitat where there will be no development.

9.2.2 Loss of ecological processes

Ecological processes vary in condition across the study site largely in relation to the condition of the habitat. The habitat at Uitkoms is ecologically functional across the site and this functionality would be kept intact if enough of the area is maintained as undeveloped space. If Alternative 1 is implemented the impact on ecological processes would be **High Negative** whereas if Alternative 1 is implemented. If Alternative 2 (preferred) is implemented the impact would be Medium to Low Negative on ecological processes (Table 3).

Table 3. Impact and Significance – Loss of ecological processes due to the 'No Go' alternative and construction alternative (including operational phase) of the proposed housing development at Uitkoms, Kathu.

Actions	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	" No Go"	Loss of ecological processes	Small (local)	Long-term	Low	Low	-ve	Probable	High
Without mitigation	Alt1	Loss of ecological processes	Small (local)	Long-term	High	High	-ve	Probable	High
With mitigation	Alt 1	Loss of ecological processes	Small (local)	Long-term	High	High	-ve	Probable	High
Without mitigation	Alt 2 (preferred)	Loss of ecological processes	Small (local)	Long-term	Medium to Low	Medium to Low	-ve	Probable	High
With mitigation	Alt 2 (preferred)	Loss of ecological processes	Small (local)	Long-term	Medium to Low	Medium to Low	-ve	Probable	High

Mitigation

No mitigation would be possible for the loss of ecological processes in the area developed for housing due to construction and operational activities at Uitkoms.

9.3 Indirect Impacts

No indirect impacts were identified for the proposed development.

9.4 Cumulative Impacts

The proposed development of the Uitkoms residential area at Kathu would contribute to the loss of Kathu Bushveld in the local area around the town of Kathu. However, Kathu Bushveld is regionally widespread and Least Threatened so the cumulative impact of the loss of natural vegetation and habitat, as well as ecological processes would be limited and is rated as **Low negative.**

10. Conclusions and Recommendations

- The investigation of the proposed area for the Uitkoms housing development at Kathu revealed that viable, well-developed Kathu Bushveld vegetation occurs over a significant part of the site but is also existing development in the form of horse stables, a racetrack etc.

  Where natural vegetation occurs it is generally a mosaic of grassland with shrub thickets dominated by *Tarchonanthus camphoratus*. Scattered or clustered trees occur with numerous of them being the protected species *Acacia erioloba* (camelthorn). Development of the site would result in local **High negative** impacts in terms of loss of vegetation and habitat at a local scale. However, at a regional scale the impact would be limited and so cumulative impacts are rated as **Low negative**. Loss of ecological processes would be Medium to Low Negative is the preferred alternative, Alternative 2 is implemented.

- No plant species of conservation concern (Red List species) (Raimondo *et al.* 2009) were found during the study. However, the *Acacia erioloba* (camelthorn) trees should be observed as a protected tree species. A permit would be required for any disturbance of these trees. A permit from the Department of Environment and Nature Conservation, Northern Cape Province would be required for the destruction of any natural vegetation.

- The Kathu Bushveld in the Uitkoms study area is Least Threatened and although there would be local loss of intact natural veld due to the proposed development, the housing development is supported without major constraints or need for cumbersome mitigation measures. The only mitigation measures recommended are firstly the planting of *Acacia erioloba* trees in 'green spaces' to compensate for any lost to the development and construction of houses and secondly, the 'Search & Rescue' of *Boophone disticha* (gifbol) plants that can be planted in the conservation area or any other area not earmarked for housing.

11. References

Brownlie, S. 2005. *Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No. ENV-S-C 2005-053 C.* Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.

Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report.

South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria.

Government Gazette No. 34809. 2011. Threatened Terrestrial Ecosystems in South Africa.

Mucina, L., Rutherford, M.C., & Powrie, L.W. (Eds.). 2005. Vegetation map of South Africa, Lesotho, and Swaziland 1:1 000 000 scale sheet maps. South African National Biodiversity Institute, Pretoria. ISBN 1-919976-22-1.

Mucina, L. & Rutherford, M.C. 2006. (eds.)The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (eds) 2009. Red List of South African plants 2009. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.

Rutherford, M.C., Mucina, M., Lötter, M.C., Bredenkamp, G.J., Smit, J.H.L., Scott-Shaw, C.R., Hoare, D.B., Goodman, P.S., Bezuidenhout, H., Scott, L., Ellis, F., Powrie, L.W., Siebert, F., Mostert, T.H., Henning, B.J., Venter, C.E., Camp, K.G.T., Siebert, S.J., Matthews, W. S., Burrows, J.E., Dobson, L., Van Rooyen, N., Schmidt, E., Winter, P.J.D., Du Preez, P.J., Ward, R.A., Williamson, S. & Hurter, P.J.H. 2006. Savanna Biome In: In: Mucina, L., & Rutherford, M.C. (Eds.). 2006. The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Van Rooyen, N. 2006. Vegetation of the Kalahari Golf & Jaglandgoed. *Specialist Report 1 of Volume 3-3 of the Final Scoping Report for the Residential Development at Sishen Golf Course, Erf 1439, Remainder of Erf 2974 and Remainder of Portion 1 of the Farm Uitkoms No. 463, Kathu* for Kalahari Golf en Jag (Pty) Ltd). MEG Environmental Impact Studies.

Visser, D. 2006. Report on the geology and geohydrology of the Kathu area. SRK Consulting, Cape Town.

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Appendix 1: Impact Assessment Methodology

The assessment of impacts needs to include the determination of the following:

- The nature of the impact – see Table 1.1
- The magnitude (or severity) of the impact – see Table 1.2
- The likelihood of the impact occurring - see Table 1.2

The degree of confidence in the assessment must also be reflected.

- ***Table 1.1 Impact assessment terminology***

Term	Definition
Impact nature	
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.

Assessing significance

There is no statutory definition of '*significance*' and its determination is, therefore, somewhat subjective. However, it is generally accepted that significance is a function of the magnitude of the impact and the likelihood of the impact occurring. The criteria used to determine significance are summarized in *Table 1.2*

- ***Table 1.2 Significance criteria***

Impact magnitude	
Extent	*On-site* – impacts that are limited to the boundaries of the rail reserve, yard or substation site. *Local* – impacts that affect an area in a radius of 20km around the development site. *Regional* – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem. *National* – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.
Duration	*Temporary* – impacts are predicted to be of short duration and intermittent/occasional. *Short-term* – impacts that are predicted to last only for the duration of the construction period. *Long-term* – impacts that will continue for the life of the Project,

	but ceases when the Project stops operating. *Permanent* – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.
Intensity	BIOPHYSICAL ENVIRONMENT: *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (i.e. habitats, species or communities).* **Negligible** – the impact on the environment is not detectable. **Low** – the impact affects the environment in such a way that natural functions and processes are not affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease. ***Where appropriate, national and/or international standards are to be used as a measure of the impact.*** *Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.* SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the Project.* **Negligible** – there is no perceptible change to people's livelihood **Low** - People/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - Those affected will not be able to adapt to changes and continue to maintain-pre impact livelihoods.
Impact likelihood (Probability)	
Negligible	The impact does not occur.
Low	The impact may possibly occur.
Medium	Impact is likely to occur under most conditions.
High	Impact will definitely occur.

Once a rating is determined for magnitude and likelihood, the following matrix can be used to determine the impact significance.

- ***Table 7.5 Example of significance rating matrix***

SIGNIFICANCE RATING					
	LIKELIHOOD	**Negligible**	**Low**	**Medium**	**High**
MAGNITUDE	**Negligible**	**Negligible**	**Negligible**	**Low**	**Low**
	Low	**Negligible**	**Negligible**	**Low**	**Low**
	Medium	**Negligible**	**Low**	**Medium**	**Medium**
	High	**Low**	**Medium**	**High**	**High**

In *Table 7.6*, the various definitions for significance of an impact is given.

- ***Table7.6 Significance definitions***

Significance definitions	
Negligible significance	An impact of negligible significance (or an insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that 'moderate' impacts have to be reduced to 'minor' impacts, but that moderate impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors such as employment, in coming to a decision on the Project.

Once the significance of the impact has been determined, it is important to qualify the **degree of confidence** in the assessment. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence can be expressed as low, medium or high.

Appendix 2: Curriculum Vitae

Dr David Jury McDonald Pr.Sci.Nat.

Name of Company: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

Work and Home Address: 14 A Thomson Road, Claremont, 7708

Tel: (021) 671-4056 **Mobile:** 082-8764051 **Fax:** 086-517-3806

E-mail: dave@bergwind.co.za

Website: www.bergwind.co.za

Profession: Botanist / Vegetation Ecologist / Consultant / Tour Guide

Date of Birth: 7 August 1956

Employment history:

- 19 years with National Botanical Institute (now SA National Biodiversity Institute) as researcher in vegetation ecology.

- Five years as Deputy Director / Director Botanical & Communication Programmes of the Botanical Society of South Africa

- Nine years as private independent Botanical Specialist consultant (Bergwind Botanical Surveys & Tours CC)

Nationality: South African (ID No. 560807 5018 080)
Languages: English (home language) – speak, read and write
Afrikaans – speak, read and write

Membership in Professional Societies:

- South Africa Association of Botanists
- International Association for Impact Assessment (SA)
- South African Council for Natural Scientific Professions (**Ecological Science, Registration No. 400094/06**)
- Field Guides Association of Southern Africa

Key Qualifications :

- Qualified with a M. Sc. (1983) in Botany and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute)

- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.
- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications; involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.

- Further tasks involved the day-to-day management of a large non-profit environmental organisation.

- **Independent botanical consultant** (2005 – to present) over 300 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is available on request.

Higher Education

Degrees obtained
and major subjects passed:

B.Sc. (1977), University of Natal, Pietermaritzburg
Botany III
Entomology II (Third year course)

B.Sc. Hons. (1978) University of Natal, Pietermaritzburg
Botany (Ecology /Physiology)

M.Sc - (Botany), University of Cape Town, 1983.
Thesis title: 'The vegetation of Swartboschkloof, Jonkershoek, Cape Province'.

PhD (Botany), University of Cape Town, 1995.
Thesis title: 'Phytogeography endemism and diversity of the fynbos of the southern Langeberg'.

Certificate of Tourism: Guiding (Culture: Local)
Level : 4 Code: TGC7 (Registered Tour Guide: WC 2969).

Employment Record :

January 2006 – present: Independent specialist botanical consultant and tour guide in own company: **Bergwind Botanical Surveys & Tours CC**
August 2000 - 2005 : Deputy Director, later Director Botanical & Communication Programmes, Botanical Society of South Africa
January 1981 – July 2000 : Research Scientist (Vegetation Ecology) at National Botanical Institute
January 1979—Dec 1980 : National Military Service

Further information is available on my company website: www.bergwind.co.za