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

Dr David J. McDonald
Bergwind Botanical Surveys & Tours CC.
14A Thomson Road, Claremont, 7708
Tel: 021-671-4056
Fax: 086-517-3806

Prepared for EnviroAfrica CC

March 2015

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 known as 'SIMS' at Kathu, Northern Cape Province.

Details of Specialist

Dr David J. McDonald Pr. Sci. Nat.
Bergwind Botanical Surveys & Tours CC
14A Thomson Road
Claremont
7708
Telephone: 021-671-4056
Mobile: 082-876-4051
Fax: 086-517-3806
e-mail: dave@bergwind.co.za
Professional registration: South African Council for Natural Scientific Professions No. 400094/06

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

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report that are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

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	17 March 2015
Name of company:	Date:

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 SIMS 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 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.
    - Assess the anticipated impacts of the proposed development on the vegetation.

3. Study Area

3.1 General location and history

Kathu is situated 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; McDonald, 2006; McDonald, 2007).

3.2 Specific location

The SIMS Residential Expansion Area is located on the western edge of the present town of Kathu (Figure 2) on the properties SIMS 462 and Remainder Portion 1 of SIMS 464. This is referred to in this report as the SIMS study site. The total area of the site is 170 ha and it consists of two parts separated by the R380 road that links Kathu with Dibeng to the northwest.

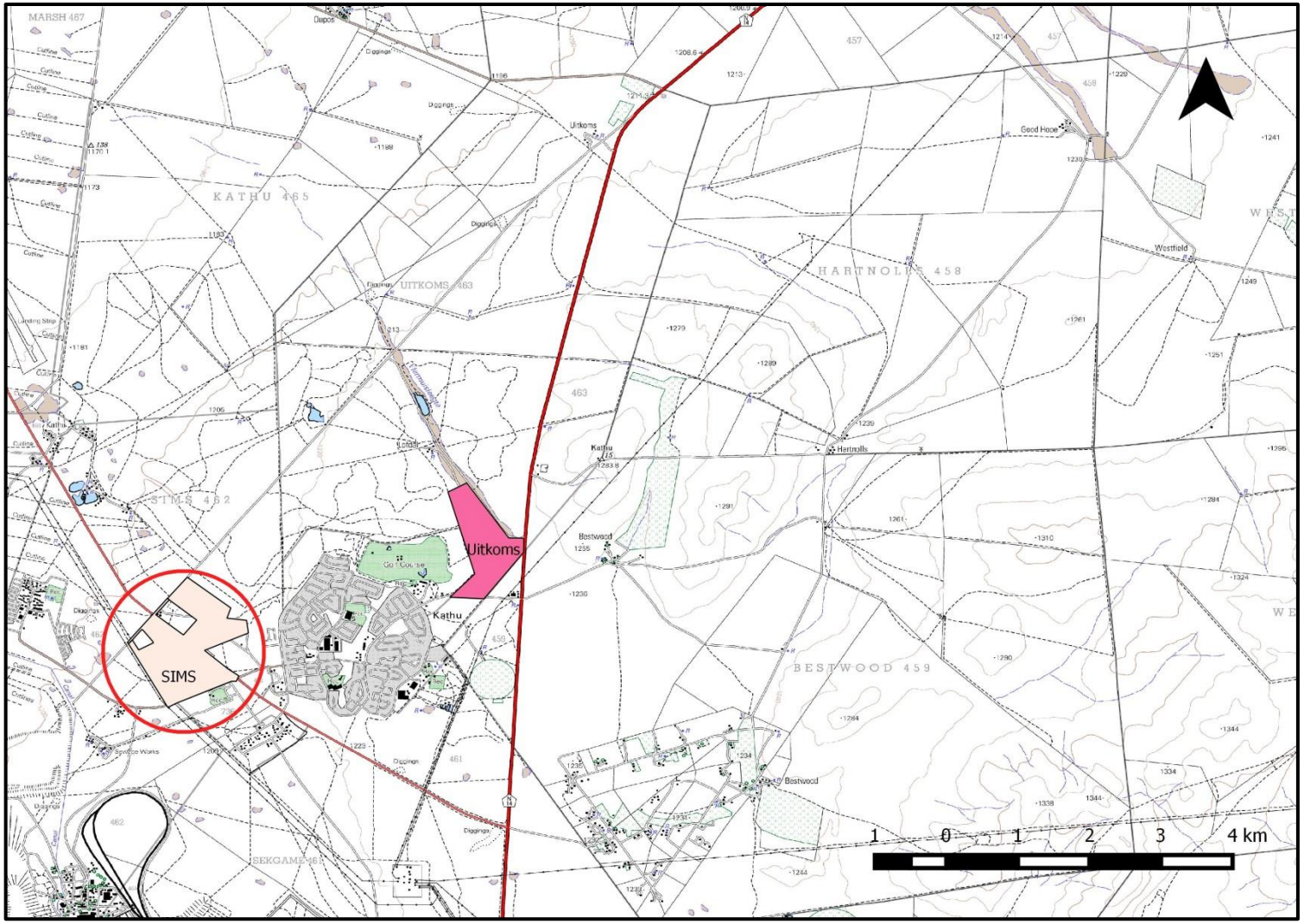


Figure 1. Portion of the 1: 50 000 topographical map 2723CA Kathu (Chief Directorate: National Geo-spatial Information) with the SIMS study area highlighted in light beige, lying west of Kathu.

Figure 2. Area of proposed housing development at SIMS, Kathu (yellow) superimposed on an aerial photograph (Google Earth ™)

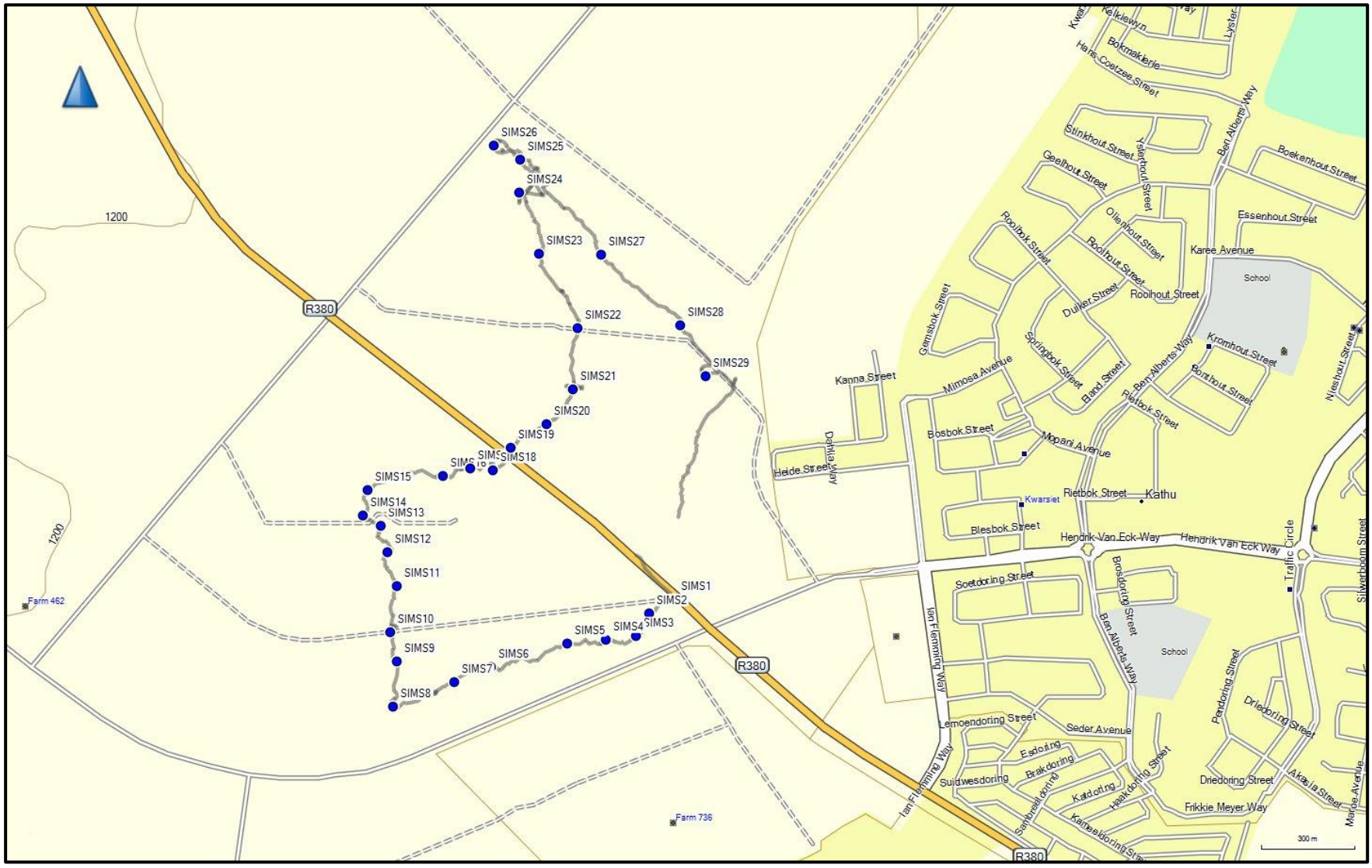


Figure 3. Topographic map of the SIMS site at Kathu showing the very low relief. The blue dots (SIMS#) indicate the botanical survey waypoints.

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).

The soils at Kathu are shallow to very shallow with calcrete cropping out at the surface in many places (Figure 3). The soils are therefore generally of the Mispah form in the study area but may be deeper Hutton form where the sand is deeper (Figure 4) and the calcrete is not near or at the surface.

Figure 4. Calcrete cropping out at the surface at Kathu resulting in very shallow soil.

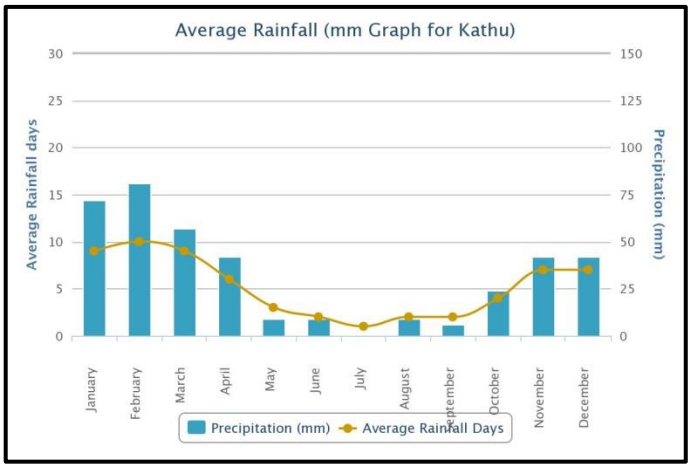
Figure 5. Characteristic shallow red sandy soil with shrubland vegetation found at the SIMS study area, Kathu.

3.4 Topography

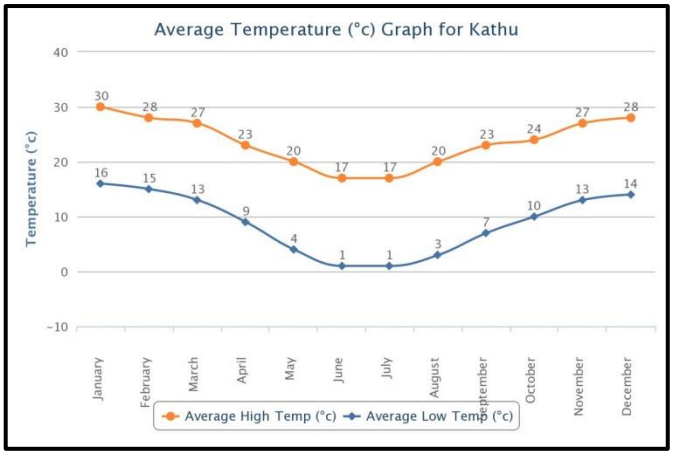
The study area is situated at 1215 m a.m.s.l. and is relatively flat. Elevation does not vary much over the whole site and there is almost no relief which is characteristic of the wide plain where Kathu is located. Aspect therefore does not have an influence on the vegetation.

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. Summer temperatures can reach 40 ºC (range 20 – 40 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).



A



B

Figure 5A. Average rainfall and **5B**. Average temperatures for Kathu (Source: www.worldweatheronline.com)

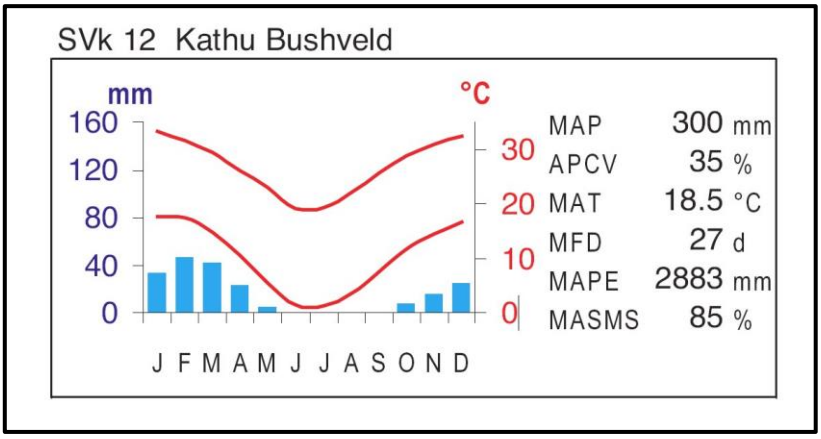


Figure 6. Climate diagram for Kathu Bushveld (from Mucina *et al.,* 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

4. Evaluation Method

The SIMS study site was visited on 13 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'. Twenty-nine 'sample waypoints' were recorded. At the 'sample waypoints' specific details of the surrounding vegetation and features of habitat were noted 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 SIMS 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.

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.

Kathu Bushveld does not harbour any threatened plant species although it does have protected trees such as *Acacia erioloba* and *Boscia albitrunca*. This vegetation type is classified as Least Threatened in the National Biodiversity Assessment of 2011 and the national conservation target is 16% of the original extent with 98% still remaining (Driver *et al*. 2012).

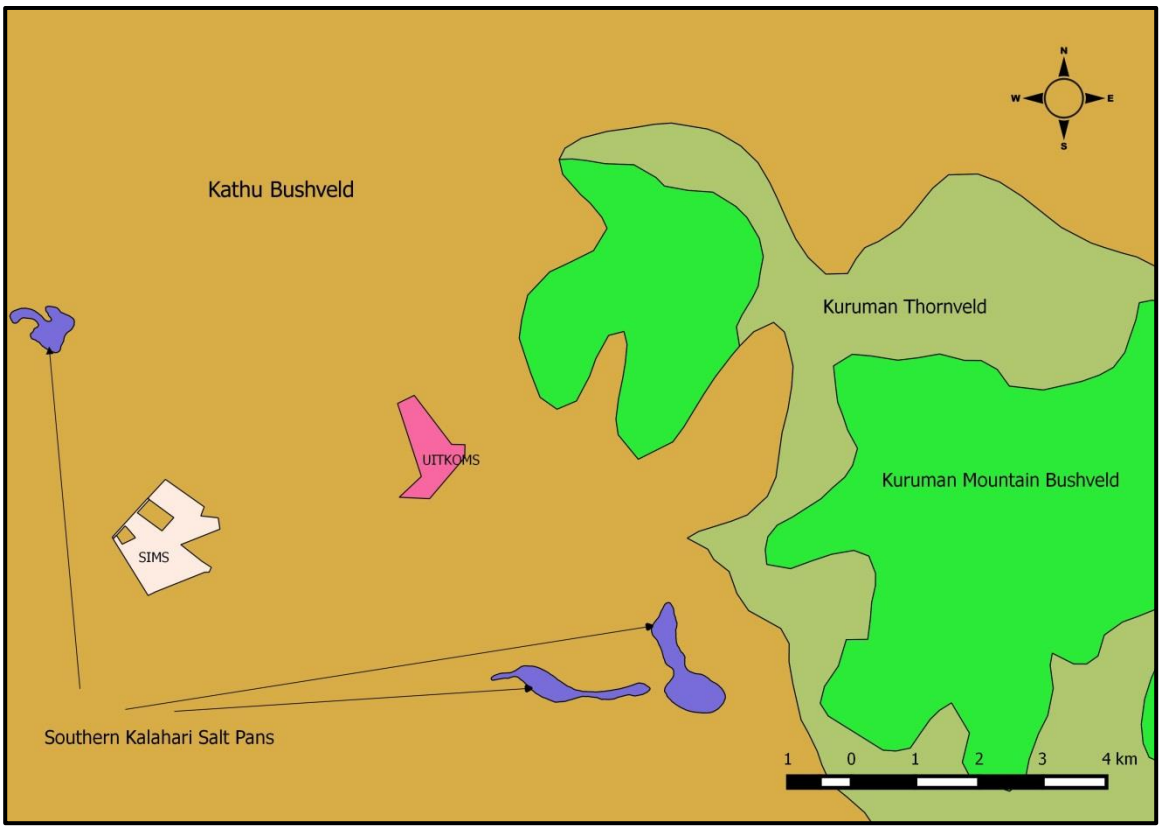


Figure 7. Portion of the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina *et al.*, 2005 and updated in 2009) showing the location of the study site (SIMS) in Kathu Bushveld (light brown).

7. Site investigation

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 e.g. endorheic pans or wetlands or other feature of botanical importance. 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.

As mentioned above, large parts of the SIMS study area had been burnt in the winter preceding the site visit (Figure 8). This had been followed by good rains during the summer. The result was that the low graminoid stratum was growing vigorously and the shrubs such as *Tarchonanthus camphoratus* (vaalbos) (Figure 9) were resprouting with *Acacia mellifera* subsp. *detinens* also resprouting and in full leaf, seemingly not affected adversely by the winter fires. Over almost the entire are of the SIMS study area, both west and east of the R380, the vegetation consists of a tall shrubland dominated by *T. camphoratus* and *A. mellifera* subsp. *detinens* and *Grewia flava* less conspicuous. Low to mid-high *Searsia* sp. shrubs are found and cucurbit creepers (cf. *Trochomeria debilis*) are found climbing in the shrubs. An open to often dense stratum of grasses occurs that includes species such as the typical Kalahari Bushveld grasses, *Aristida meridionalis, Eragrostis lehmanniana, Eragrostis chloromelas, Schmidtia pappaphoroides, Schmidtia kalahariensis, Stipagrostis ciliata, Stipagrostis uniplumis, Aristida congesta*, *Melinis repens* and *Tragus berteronianus* in more disturbed places.

Figure 8. Typical shrubby bushveld found on the SIMS site. The vegetation was burnt in a winter fire and was regenerating vigorously at the time of the site visit.

Figure 9. *Tarchonanthus camphoratus* (vaalbos), with grey leaves in fore- and mid-ground; a co-dominant shrub in the SIMS study area.

Forbs are common but not prominent and a notable species is the suffrutex *Elephantorrhiza elephantina* (Figure 10), that was strongly stimulated by the fire. This fire-adapted species has most of its biomass underground. Thunderbolt flowers (*Sesamum triphyllum* – Figure 11) were noted in areas that had been burnt.

Figure 10. *Elephantorrhiza elephantina* – eland's bean or olifantswortel

Figure 11. *Sesamum triphyllum* – thunderbolt flower.

Acacia erioloba (camel thorn) was noted as occurring at the locations given in Table 1. *A. erioloba* mostly occurs on the western part (i.e. west for R308) of the SIM site.

Table 1. Locations of *Acacia erioloba* (camel thorn) in the SIMS study area.

Waypoint	Coordinates	Description
SIMS1	S 27 42 05.1 E 23 01 53.7	A few small trees
SIMS2	S 27 42 06.5 E 23 01 50.9	A cluster of three trees
SIMS3	S 27 42 08.9 E 23 01 49.5	Young and immature tree emergent and scattered. This area was burnt and one of the *A. erioloba* trees had died.
SIMS4	S 27 42 09.2 E 23 01 46.2	Scattered, immature *A. erioloba* trees
SIMS13	S 27 41 57.4 E 23 01 21.3	Waypoint is at a large *A. erioloba*. There are a number of mature *A. erioloba* trees in this area.
SIMS14	S 27 41 56.4 E 23 01 19.3	A few *A. erioloba* trees on the edge of the limestone quarry. The patch of *A. erioloba* trees extends northeast of the quarry in the direction of the northeast corner of the site at R308.
SIMS16	S 27 41 52.3 E 23 01 28.2	Scattered medium-sized *A. erioloba* trees that have died from fire.
SIMS18	S 27 41 51.7 E 23 01 33.7	At an old A. erioloba tree near the R308 road. Another smaller tree is found nearby.
SIMS26	S 27 41 18.3 E 23 01 33.7	A low *A. erioloba* found amongst dense bush.

8. Important botanical / landscape features

8.1 Reservoir thicket

An old, broken reservoir is found at waypoint SIMS13. The surrounding area has a number of mature *Acacia erioloba* trees that should be conserved where possible. The vegetation under the tall trees consists of *Ziziphus mucronata–Diospyros lycioides* thicket with verdant grasses in the gaps.

Figure 12. The old, broken reservoir with patches of thicket and scattered mature Acacia erioloba trees nearby.

8.2 *Aloe* population

A population of the widespread *Aloe grandidentata* (Figure 13) (Grace *et al.* 2011; Van Wyk & Smith, 2003) was found at waypoint SIMS22 (S 27° 41’ 37.1” E 23° 01’ 43.0”). This aloe is not threatened but since all aloes in the Northern Cape Province are protected species, these plants should be rescued and transplanted at a safe location. A permit would be required for this purpose.

Figure 13. A population of the stemless, spotted aloe, *Aloe grandidentata* (bontaalwyn; kanniedood) found at waypoint SIMS22.

8.3 Seasonal pan

In the northeast part of the SIMS study area, east of the R308 is a seasonal pan or endorheic pan found at waypoint SIMS24 (S 27° 41' 23.1" E 23° 01' 36.6") [Figure 13]. Inflow is through runoff and groundwater but it has no has no outflow. It has a core area (depression) and then zones in a concentric pattern from the centre. The central zone is grassy with *Eragrostis* sp. (fine) and then *Setaria* sp. forms a second outer zone. On the perimeter is bushy thicket with a few large *Acacia karoo* trees. At the waypoint SIMS24 is a prominent thicket of *Diospyros lycioides*, *Ziziphus mucronata* and *Searsia pendulina*. A small amount of water was found in the pan at the time of the survey (13 March 2014).

The pan should be preserved and buffered. Ideally it should form the central feature of an open space area. Of importance is that it is seasonal and requires runoff from the surrounding area.

Figure 13. The seasonal endorheic pan at waypoint SIMS24.

8.4 Wooded thicket

An impenetrable wooded thicket is found at waypoint SIM26 (S 27° 41' 18.3" E 23° 01' 33.7"). The central part of this area has exposed calcrete boulders and it may be that these boulders were dumped here in the past, encouraging development of thicket that is taller in stature and much denser than the surrounding shrubland. Species recorded in the thicket include *Acacia erioloba, Acacia karoo, Acacia mellifera subsp. detinens, Diospyros lycioides, Grewia* cf. *flava, Lycium* sp., *Searsia pendulina* and *Ziziphus mucronata.*

9. Discussion

Observations during the field investigation at the SIMS study site verified the classification of the vegetation as Kathu Bushveld and revealed that this area is more typically bushveld than the area in Kathu town where there are many old and well-established camel thorn trees (*Acacia erioloba*) and the vegetation is more 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).

10. Layout of residential development

The proposed layout of the residential development went through a number of iterations that were informed by the botanical survey as well as other specialist studies. The layout presented in Figure 14 is the 'final layout' and takes into consideration the botanically sensitive areas at waypoints SIMS13, SIMS24 and SIMS26 as described in Section 8 above. The layout (Figure 14) is the 'preferred alternative' as opposed to the other layout iterations (viewed as the less preferred alternatives) that are not presented here.

11. Impact Assessment

11.1 Assessed impacts

Impacts on the vegetation are assessed for the 'No Go' Alternative and single development alternative for the proposed SIMS 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 level of negative use of the area by pedestrians and illegal informal residents that could continue if the area is not developed.

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.

11.2 Assessment Methodology for Direct Impacts

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.

Figure 14. Final layout of the proposed housing development at SIMS, Kathu, Northern Cape

11.2.1 Direct Impacts

The impacts on the vegetation and habitat for the proposed housing development at SIMS, 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

11.2.1.1 Loss of Kathu Bushveld and habitat including plant species due to construction and operational activities

A distinction must be made between direct impacts at a local scale and those at a regional scale. At the local scale of the SIMS site, the impact would be dramatic i.e. all the vegetation would be removed including at least some of the *Acacia erioloba* (camelthorn) trees. The result would be a **High negative** impact at a local scale (Table 1) both during the construction and operational phases. Regionally, however, the impact would be **Low negative** (see Cumulative impacts below).

Table 1. Impact and Significance – Loss of Kathu Bushveld and associated habitat due to the 'No Go' alternative and construction alternative (including operational phase) of the proposed housing development at SIMS, 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

Mitigation

Opportunities for mitigation would be very limited due to the intense scale of the proposed development. Small mitigation measures can and should be implemented such as preservation of areas of open space e.g. around the seasonal pan but these would

not necessarily conserve the nature of the Kathu Bushveld. For this reason any mitigation measures applied would not greatly reduce the negative impact hence the impacts would remain High negative even after mitigation.

11.2.1.2 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 SIMS is ecologically functional across the whole site and this functionality would be entirely lost due to the proposed development. The impact would thus be **High negative** on ecological processes (Table 2).

Table 2. 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 SIMS, 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

Mitigation

No mitigation would be possible for the loss of ecological processes due to construction and operational activities on the SIMS housing development site.

11.2.2 Indirect Impacts

No indirect impacts were identified for the proposed development.

11.2.3 Cumulative Impacts

The proposed development of the SIMS 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.**

12. Conclusions and Recommendations

- The investigation of the proposed area for the SIMS housing development at Kathu revealed that viable, well-developed Kathu Bushveld vegetation occurs throughout the site. This vegetation is generally shrubland with scattered trees, some of which are the protected species *Acacia erioloba* (camelthorn). Development of the site would result in **High negative** impacts both in terms of loss of vegetation and habitat as well as ecological processes at a local scale. However, at a regional scale the impact would be limited and so cumulative impacts are rated as **Low negative**.

- 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. In addition, *Aloe grandidentata* was found in the eastern part of the site. These aloes should be collected and relocated to a safe site. This would also require a permit from the Department of Environment and Nature Conservation, Northern Cape Province.

- The seasonal pan in the north-eastern sector of the site should be conserved and well-buffered to allow for seasonal collections of water. Ideally this pan should be within an open space area as depicted and proposed in Figure 14. This open space would also accommodate the wooded thicket described above (waypoint SIMS26).

- In the western part of the SIMS site the area around the old reservoir should also be conserved as 'open space' with as many as possible of the mature *Acacia erioloba* trees in this area conserved as well (around waypoint SIMS13).

- The Kathu Bushveld in the SIMS 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.

13. 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.

Grace, O.M., Klopper, R.R., Figueiredo, E. & Smith, G. 2011. The aloe names book. *Strelitzia* 28. South African National Biodiversity Institute, Pretoria and the Royal Botanic Gardens, Kew.

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

McDonald, D.J. 2006. Botanical Assessment of site for proposed Village Walk Shopping Centre at Kathu, Northern Cape. Unpublished report for EnviroAfrica.

McDonald, D.J. 2007. Botanical Assessment of site for proposed development on Erf 5168 at Kathu, Northern Cape. Unpublished report for EnviroAfrica.

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 Wyk, B-E. & Smith, G. 2003. *Guide to the Aloes of South Africa*. Second Edition. Briza Publications. Pretoria. pp 304.

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.

Report submitted: 17 March 2015

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