APPENDIX F2 B: ECOLOGICAL STUDY

Ecological Assessment for Door of Hope Children's Mission Village Estate, Gauteng, South Africa.

Prepared by

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For

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

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Appointment of Specialist

Leigh-Ann de Wet was commissioned by CES to undertake an Ecological Impact Assessment for the proposed Door of Hope Children's Mission Village Estate, Gauteng, South Africa. Terms of reference were to produce an Impact Assessment Report based on the results of a desktop assessment and associated site visit.

Expertise of the specialist

- M.Sc. in Botany from Rhodes University.
- Registered Professional Natural Scientist with the South African Council for Natural Scientific Professionals (Ecological Science: 400233/12).
- Ecological Consultant since 2009.
- Conducted, or have been involved in over 100 Ecological Impact Assessments, Baseline surveys, Biodiversity Action Plans and Offset Plans.
- Published four scientific papers, two popular articles and have three scientific papers in preparation.
- Presented 7 international conference presentations, and at two Botanical Society meetings.
- Lectured methods for specialist assessment for the Rhodes University short course on EIA.

Independence

Leigh-Ann de Wet has no connection with Door of Hope Children's Mission and is not a subsidiary of any kind of Door of Hope Children's Mission. The remuneration for services by CES in relation to this report and associated studies is unrelated to approval by decision-making authorities responsible for authorization of any Door of Hope Children's Mission activity.

Scope and Purpose of Report

The scope and purpose of the report is described in the section on Terms and Reference within this report.

Executive Summary

The Door of Hope Children's Mission has proposed the development of a village estate including schools, offices and housing along with other associated infrastructure. The development is aimed at the development of a community of families who will live together. This assessment provides a brief baseline of the proposed building site, as well as providing a summary of the vegetation and flora on site. Impacts are rated, and mitigation measures to reduce these impacts made.

The study area includes a ridge that comprises sections that form a Class 3 ridge, and some areas of the ridge that are transformed. The study area also falls within a CBA and ESA identified by the Gauteng C-Plan. The study area comprises Gauteng Shale Mountain Bushveld according to Mucina and Rutherford. No protected areas or National Protected Areas Expansion Strategy areas lie within 10kms of the site. Two Threatened Ecosystems occur within 5km of the site.

There are two main vegetation communities within the study area, these are grasslands (12.97ha), and the ridge (4.11ha). The area can be further divided into stands of alien trees, primarily *Eucalyptus grandis*, which extend in a line, possibly as a wind break, along the eastern edge of the property (5.4ha). Infrastructure, most of it pre-existing has also been built on the ride to the south of the site (1.52ha). The study area comprises both ridge open thicket as well as grassland. Overall, 66 species have been identified from the site. The site visit resulted in the recording of three Confirmed Species of Conservation Concern: *Gloriosa superba, Scadoxus puniceus* and *Aloe zebrina.* Other notable species include *Boophone disticha, Hypoxis hemerocallidea, Ledebouria marginata* and *Hypoxis multiceps*. The sensitivity of the grassland is low, with the sensitivity of the ridge moderate.

Impacts in general are medium negative and can be reduced to low negative with appropriate mitigations measures. Impacts associated with the loss of the ridge are a high negative and above the limits of acceptable change, indicating that the ridge areas be avoided.

Summary of impacts associated with the Hope Village Estate.

Impact	Without Mitigation	With mitigation
Issue 1: Loss of vegetation communities		
1: Loss of grassland	Moderate -	Moderate -
2: Loss of ridge open thicket*	High -	High -
Issue 2: Loss of Species of Conservation Concern and Biodiversity		
3: Loss of Species of Conservation Concern	Moderate -	Low -
4: Los of biodiversity in general	Moderate -	Low -
Issue 3: Ecosystem function and process		
5: Fragmentation	Moderate -	Low -
6: Invasion of alien species	Moderate -	Low -

*No impact will occur if the ridge is avoided, as per recommendation

Mitigation and management

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation.
- Avoid any construction or related activity occurring within the grasslands outside of the property as part of this development, including dumping, use of the grassland as a toilet, harvesting of plants etc...
- The ridge should not be further developed but rather managed as a conservation area or open space within the development.
- Any populations of SCC should be avoided wherever possible, where they cannot be avoided, every effort should be made to replant these individuals elsewhere in the landscaped gardens, or plant an equivalent or greater number of new individuals elsewhere in the gardens;
- A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation.
- Where possible at least one (comprising the ridge) corridors of natural vegetation should be incorporated into the design of the estate to allow for the retention of biodiversity within the site.
- Any existing and new alien species must be removed as soon as possible after emergence.
- An alien vegetation management plan must be applied to the site to maintain the site free of alien invasions throughout the construction and operational phase of the development.

Recommendations

It is the opinion of the specialist that the proposed development should go ahead, provided the following criteria are met:

1) The layout of the estate is adjusted to form natural corridors comprising, at the very least, the ridge areas but ideally including a grassland corridor as well;
2) Any and all corridors should be managed as conservation areas including alien vegetation control. They may be used as education areas;
3) The development and implementation of an alien invasive management plan for the site;
4) Permits must be obtained for each of the plant species that will be destroyed where required, this must be done by a qualified professional; and

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1 Introduction

The Door of Hope Children's Mission has proposed the development of a village estate including schools, offices and housing along with other associated infrastructure. The development is aimed at the development of a community of families who will live together.

This assessment provides a brief baseline of the proposed building site, as well as providing a summary of the vegetation and flora on site. Impacts are rated, and mitigation measures to reduce these impacts made.

1.1.1 Terms of Reference

The Terms of Reference (ToR) for the study are as follows:

- Identify and map vegetation communities within the site boundary and 200m surrounding the site;
- Identify all species encountered during the site visit and list these noting their presence within particular communities, as well as their habit (shrub, tree, geophyte etc…);
- Identify all alien plant species on site and map their location;
- Identify any Species of Conservation Concern (SCC) on site and map populations of these plants where possible;
- Determine and map the ecological sensitivity of each of the plant communities identified on site;
- Determine the status of the class 3 ridge areas located on site (transformed, degraded, pristine etc);
- Determine the activities permitted on the ridge based on field findings and the guidelines for class 3 ridges;
- Determine and rate the impacts of the proposed development to the vegetation and flora of the site;
- Recommend mitigation measures to reduce negative impacts associated with the proposed development;
- Make recommendations for the development based on the outcomes of the study.

1.1.2 Assumptions and limitations

- The field work was conducted over one day on the 21st of November 2018. The site assessment was conducted in summer (November to April) as per the guidelines for Gauteng.
- It should be noted that despite the timing of the study (in the wet season) the site (especially grassland areas) was particularly dry. This means that there is potential for geophytic, herbaceous and Graminaceaous plants to have been missed in this site visit but the information gathered is sufficient for the purpose of this assessment.
- Impacts have been rated based on the site layout as provided by CES at the time of writing this report.

2 The study area

2.1 Locality

The proposed site for this development is located in Aloe Ridge Drive, De Deur, Gauteng, South Africa (Figure 2-1). The site is the remaining extent of portion 19 of the farm Hartsenbergfontein 332. The development comprises a suite of buildings to house families as well as the orphanage and associated infrastructure including an office and administration building, a school, early childhood development and learning centres and residential houses. Currently the bulk of the existing residential areas are located to the south of the site, centred on rocky outcrops and the ridge area.

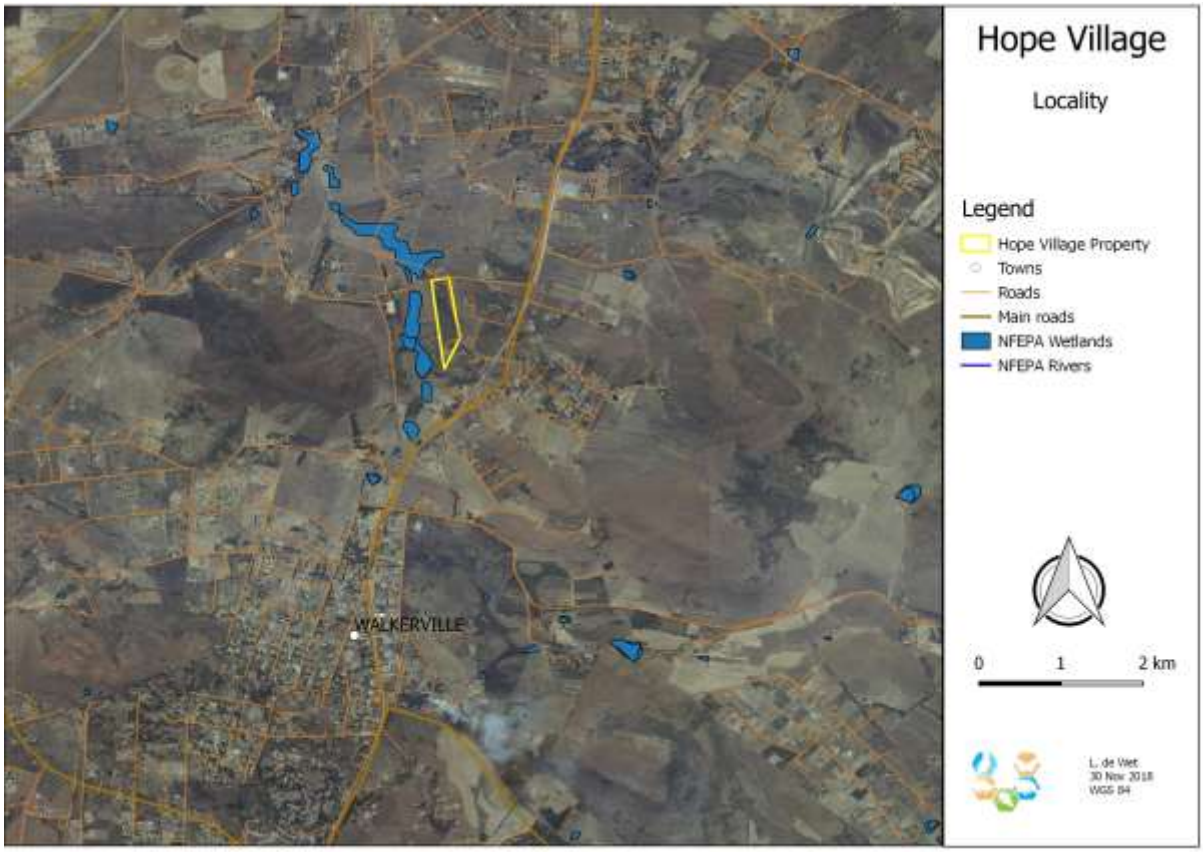

Figure 2-1: Locality map of the Door of Hope Village Estate site.

3 Methodology

The methodology for this assessment is based on analyses of available desktop information, a site visit and a resultant sensitivity and impact assessment. The methods of each of these study components are outlined below.

3.1 Desktop Assessment

Available desktop information was assessed to contextualize the site, and several databases and mapping tools were checked. These included the following:

- Google earth imagery was used to determine the current vegetation cover of the site;
- The National Vegetation Map developed by Mucina and Rutherford (2012 (Beta)) was consulted to determine the expected vegetation type;
- The Plants of South Africa (POSA) database was consulted for a list of plant species previously recorded from the general area including the site;
- The species lists for each of the vegetation types occurring in the study site provided by Mucina and Rutherford (2011) were used to augment the POSA species list;
- Conservation Planning Tools such as the List of Ecosystems that are Threatened and in Need of Protection, Wetlands datasets (NFEPA) and the Gauteng Conservation Plan (C-Plan) were mapped for the study site;
- A list of possible invasive species was extracted from the POSA list of plants recorded from the Pretoria National Botanical Gardens;
- A list of Possible Species of Conservation Concern was extracted from the POSA list of plants recorded from the Pretoria National Botanical Gardens though checking the list of recorded species against the following lists:
    - National Protected Tree List (Government Gazette Vol. 593, 21 November 2014, No. 38215);
    - Provincial Protected Species List (Traansvaal Nature Conservation Ordinance No. 12 of 1983);
    - National Protected Species List or TOPS (R 1187 of 2007); and
    - The National Red List for Plants (redlist.sanbi.org, as given by POSA).

3.2 Field Assessment

The site was surveyed based on Google Earth imagery and divided into areas of specific vegetation types as per stratified random sampling methodology. Each of these vegetation types were then surveyed in the field, with adaptive field techniques applied where in-field conditions required. For each of the different vegetation types, sample plots were done based on the field survey methodology described by Hawthorne for Rapid Botanical Sampling. Braun Blanquet was then used to determine the species list, dominant species in each vegetation type and the presence of Species of Conservation Concern and alien invasive species. These data were then used to describe the different plant communities on site. Figure 3-1 shows the sample plots for the study area.

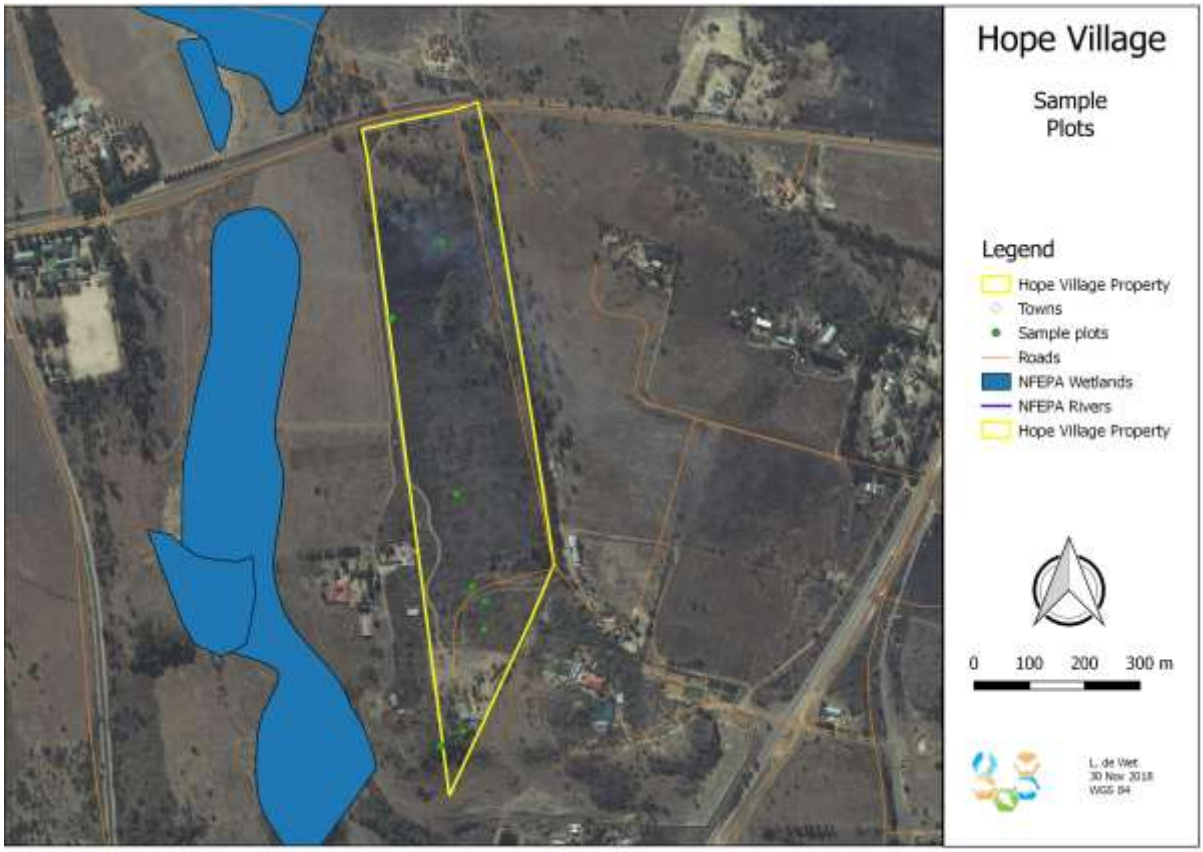

Figure 3-1: Sample plots at the Door of Hope Village Estate site.

3.3 Sensitivity Assessment

A list of sensitivity criteria was assessed, and the value of each of these criteria assigned a weighted score. The resultant matrix is then used to produce an overall sensitivity. This assessment determines the overall sensitivity of the site and aids in the making of recommendations with regards to proposed development within the site. Sensitivity criteria include the following:

- Species of Conservation Concern (Any red listed or protected species);
- Presence of sensitive habitats (such as wetlands, rocky outcrops);
- Presence of Critical Biodiversity Areas;
- Level of degradation of the site (erosion, grazing);
- Presence of indigenous vegetation;
- Proximity to watercourses;
- Proximity to wetlands;
- Proximity to National Parks;
- Proximity to other protected areas;
- Proximity to National Protected Areas Expansion Strategy (NPAES) Focus Areas;
- Proximity to Important Bird Areas (IBAs);
- Proximity to Ramsar sites;

- Proximity to World Heritage Sites; and
- Proximity to Threatened Ecosystems as gazetted.

3.4 Impact Assessment

The CES rating scale was used to rate the impacts for this assessment. The methodology is as follows.

Five factors need to be considered when assessing the significance of impacts, namely:

1. Relationship of the impact to **temporal** scales - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
2. Relationship of the impact to **spatial** scales - the spatial scale defines the physical extent of the impact.
3. The severity of the impact - the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.

The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation' but includes concepts of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

4. The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
5. Each criterion is ranked to determine the overall **significance** of an activity (**Table 3-1**). The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in **Table 3-2** and **Table 3-3**, to determine the overall significance of the impact. The overall significance is either negative or positive.

Table 3-1: Ranking of Evaluation Criteria

EFFECT	**Temporal Scale**		
	Short term	Less than 5 years	
	Medium term	Between 5-20 years	
	Long term	Between 20 and 40 years (a generation) and from a human perspective also permanent	
	Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there	
	Spatial Scale		
	Localised	At localised scale and a few hectares in extent	
	Study Area	The proposed site and its immediate environs	
	Regional	District and Provincial level	
	National	Country	
	International	Internationally	
	Severity	**Severity**	**Benefit**
	Slight	Slight impacts on the affected system(s) or party(ies)	Slightly beneficial to the affected system(s) and party(ies)
	Moderate	Moderate impacts on the affected system(s) or party(ies)	Moderately beneficial to the affected system(s) and party(ies)
	Severe/ Beneficial	Severe impacts on the affected system(s) or party(ies)	A substantial benefit to the affected system(s) and party(ies)
	Very Severe/ Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) and party(ies)
LIKELIHOOD	**Likelihood**		
	Unlikely	The likelihood of these impacts occurring is slight	
	May Occur	The likelihood of these impacts occurring is possible	
	Probable	The likelihood of these impacts occurring is probable	
	Definite	The likelihood is that this impact will definitely occur	

** In certain cases it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know*

Table 3-2: Matrix used to determine the overall significance of the impact based on the likelihood and effect of the impact.

Likelihood		Effect													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	2	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	3	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	4	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 3-3: Description of Environmental Significance Ratings and associated range of scores.

Significance Rate	Description	Score
Low	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment.	LOW
Moderate	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.	MEDIUM
High	A serious impact, if not mitigated, may prevent the implementation of the project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe effects or beneficial effects.	HIGH
Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are not able to be mitigated and usually result in very severe effects, or very beneficial effects.	VERY HIGH

The environmental significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Prioritising

The evaluation of the impacts, as described above is used to assess the significance of identified impacts and determine which impacts require mitigation measures.

Negative impacts that are ranked as being of "VERY HIGH" and "HIGH" significance will be investigated further to determine how the impact can be minimised or what alternative activities or mitigation measures can be implemented. These impacts may also assist decision makers i.e. numerous HIGH negative impacts may bring about a negative decision. For impacts identified as having a negative impact of "MODERATE" significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed. For impacts ranked as "LOW" significance, no investigations or alternatives will be considered. Possible management measures will be investigated to ensure that the impacts remain of low significance.

4 Conservation planning

There are several conservation planning tools that help with guiding proposed developments as well as assessing their ecological sensitivity, each of these was considered and assessed.

4.1 Gauteng Ridges

The study area includes, in the southern corner a ridge that comprises sections that form a Class 3 ridge, and some areas of the ridge that are transformed (Figure 4-1). According to Bredenkamp & Brown (1998 In: Pfab 2001): "The quartzite ridges of Gauteng, together with the Drakensberg Escarpment, should be regarded as one of the most important natural assets in the entire region of the northern provinces of South Africa. They are characterised by a unique plant species composition that is found nowhere else in South Africa or the world." In Gauteng, any topographic feature with a slope of 5^{O} or more is defined as a ridge. The Development Guidelines for Ridges indicates that ridges are important as biodiversity hotspots and refuges, as well as providing habitat for Species of Conservation Concern, wildlife corridors, and an important art of ecosystem processes (Pfab 2001, updated in 2006).

As ridges are important, the provincial government has adopted a strict no-go or low impact development policy (Pfab 2001, updated in 2006). The ridges in the province are divided into 4 classes with land use guidelines as per Table 4-1. Land use guidelines for the Hope Village site are those for Class 3 ridges. As the ridge is significantly impacted due to previous construction in conjunction with alien invasion, the guidelines for Class 4 ridges in this state indicate that the Class 4 guidelines should be applied.

Table 4-1: Categories and land use guidelines for ridges.

Ridge type	% of Gauteng Ridges	Policy
Class 1 (0 – 5% transformed)	47	• The consolidation of properties on Class 1 ridges is supported. • Further development activities and subdivisions will not be permitted on Class 1 ridges. • Only low impact activities with an ecological footprint of 5% or less will be permitted in the 200 metre buffer zone of the ridge.
Class 2 (5 – 35% transformed)	40	• The consolidation of properties on Class 2 ridges is supported. • The subdivision of property on Class 2 ridges will not be permitted. • Development activities and uses that have a high environmental impact on a Class 2 ridge will not be permitted. • Low impact development activities, such as tourism facilities, which comprise of an ecological footprint of 5% or less of the property may be permitted. (The ecological footprint includes all areas directly impacted on by a development activity,

Ridge type	% of Gauteng Ridges	Policy
		including all paved surfaces, landscaping, property access and service provision). • Low impact development activities on a ridge will not be supported where it is feasible to undertake the development on a portion of the property abutting the ridge.
Class 3 (35 – 65% transformed)	8	• The consolidation of properties on Class 3 ridges is supported. • The guidelines for Class 2 ridges will be applied to areas of the ridge that have not been significantly impacted on by human activity. • The guidelines for Class 4 ridges will be applied to areas of the ridge that have been significantly impacted on by human activity.
Class 4 (65 – 100% transformed)	5	• The consolidation of properties on Class 4 ridges is supported. • The subdivision of property on Class 4 ridges will not be permitted in areas of the ridge where the remaining contiguous extent of natural habitat is 4ha or more. • Further development activities will not be permitted in areas of the ridge where the remaining contiguous extent of natural habitat is 4ha or more.

4.2 Gauteng C-Plan

The most up to date and comparatively accurate conservation-planning tool is the Gauteng C-Plan. The main purposes of the C-Plan are:

- "to serve as the primary support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process;
- to inform protected area expansion and biodiversity stewardship programmes in the province;
- to serve as a basis for development of Bioregional Plans in municipalities within the province."

CBAs are areas that need to be conserved in a natural or near natural state order to meet conservation targets, with ESA important for maintaining connectivity. There is an extensive network of these areas in the City of Johannesburg.

The study area falls within a CBA and ESA identified by the C-Pan (Figure 4-2). Compatible land uses for such a CBA include conservation and associated activities and land management recommendations are to obtain formal protection of these sites where possible and implement appropriate zoning to avoid net loss of intact habitat or identified land use. The site as a whole, regardless of being within a CBA is degraded, with little of conservation concern. A maintenance of corridors within the site will result in the retention of ESA properties. However, considering the degraded nature of the site, along with the level of alien invasion, the site is not considered to be of high conservation value.

4.3 Threatened Ecosystems

The list of threatened ecosystems covers terrestrial system only, with aquatic systems covered by NFEPA (See Section 3.4) (SANBI 2018). The ecosystems on the list comprise four categories, which are detailed in Table 4-2. The list of threatened ecosystems aims to reduce the rate of species and ecosystem extinction, reduce degradation of these systems as well as maintain the structure, function and composition of these systems. Threatened ecosystems represent 9.5% of the total area of South Africa (SANBI 2018).

Table 4-2: Categories of Threatened Ecosystems[1]

Category	Abbreviation	Description
Critically Endangered	CR	Ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation.
Endangered	EN	Ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems.
Vulnerable	VU	Ecosystems that have a high risk of ondergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.
Protected	-	Ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

The study area has two Threatened Ecosystems within 10kms. These are the Critically Endangered Kliprivier Highveld Grassland and the Vulnerable Soweto Highveld Grassland. However, the Hope Village site does not fall into any threatened ecosystems (Figure 4-3).

4.4 Protected Areas

Formal protected areas are those that are included in the National Environmental Management: Protected Areas Act (Act 57 of 2003) and include nature reserves, national parks and protected environments. Protected areas provide protection against climate change and aid in ecological sustainability (Government of South Africa, 2008). Proximity to protected areas is important, as sites close to these areas may be ecologically sensitive, and buffers around protected areas should be maintained to preserve biodiversity and connectivity. The study area has no Protected Areas, or Protected Area Expansion Strategy Focus Areas within 10kms.

[1] National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002).

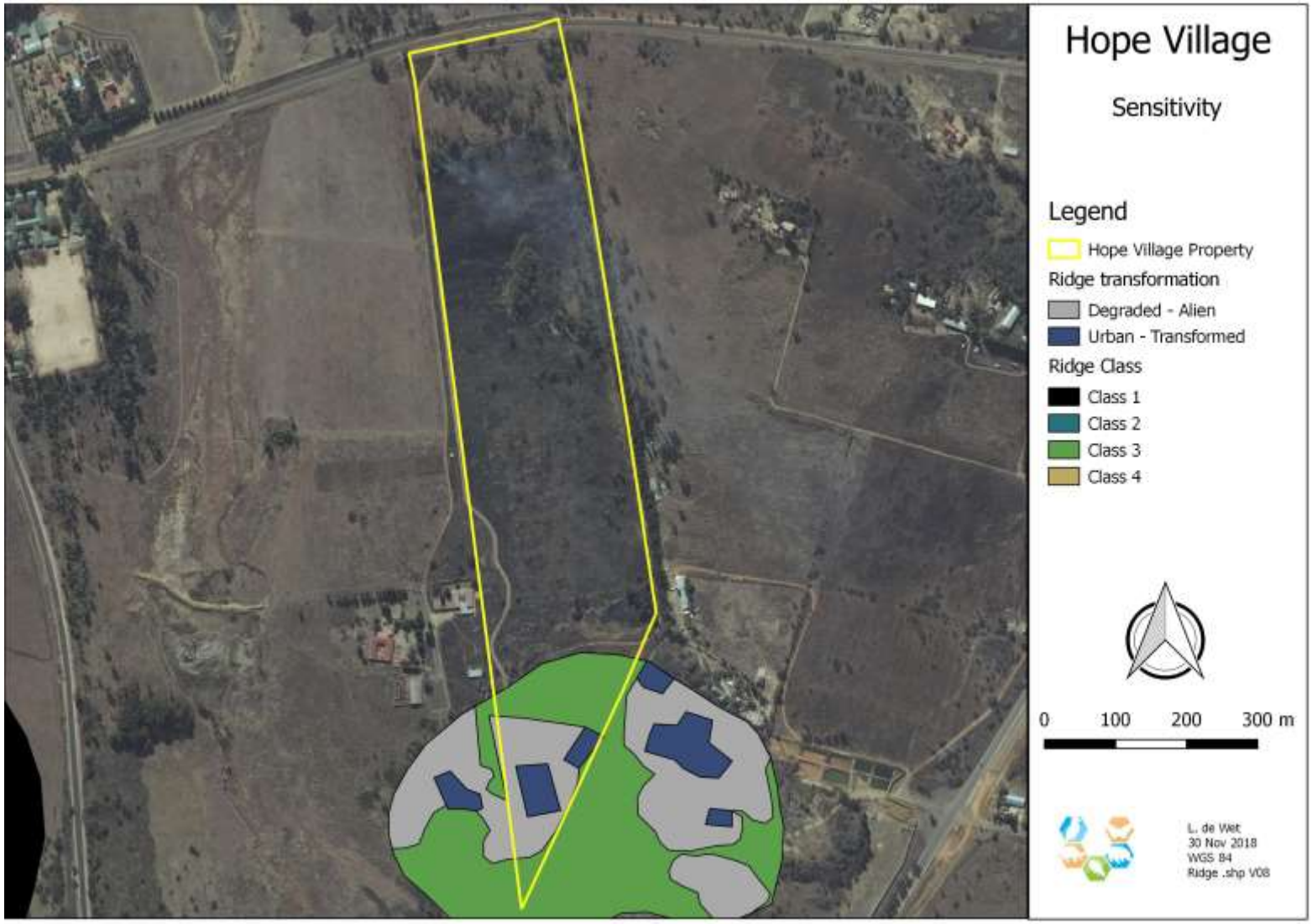

Figure 4-1: Ridges within the Hope Village Estate site.

Figure 4-2: Critical Biodiversity Areas within and near to the Hope Village Estate site.

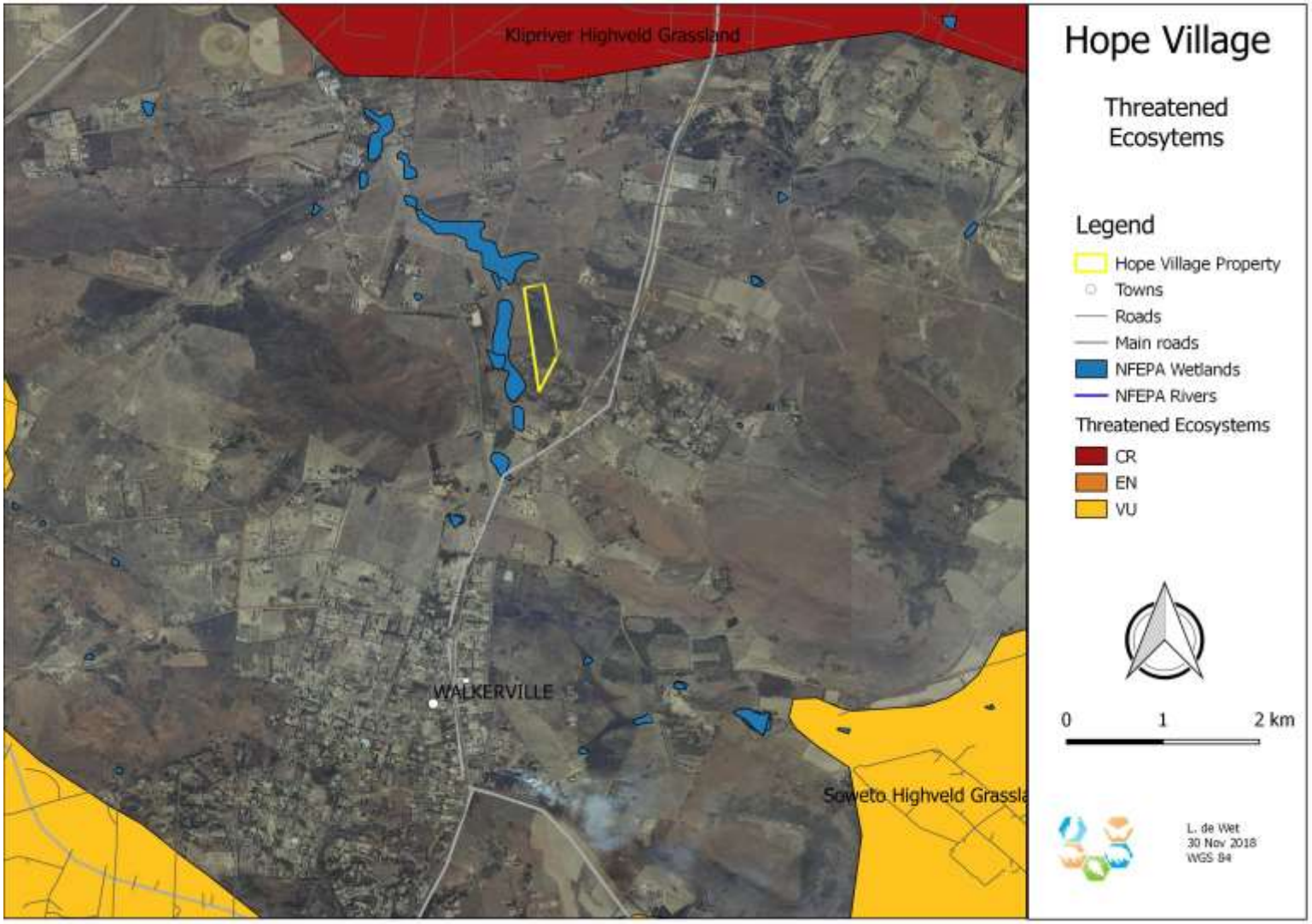

Figure 4-3: Threatened Ecosystems within and near to the Hope Village Estate site.

5 Biodiversity baseline

5.1 Vegetation

According to Mucina and Rutherford (2006), there is one vegetation type (Gauteng Shale Mountain Bushveld) within the Hope Village site (Figure 5-3).

5.1.1 Gauteng Shale Mountain Bushveld

This vegetation type occurs within the Gauteng province along ridges at an altitude of 1 300 to 1750metres (Mucina & Rutheroford 2011). It occurs on low, broken ridges with varying steepness and rocky outcrops with short vegetation ranging from 3 to 6m. It comprises an open thicket dominated by *Vachellia caffra, Searsia leptodictya, Searsia magalismontana, Cussonia spicata, Ehretia rigida, Maytenus heterophylla, Euclea crispa, Zanthoxylum capense, Dombeya rotundifolia, Protea caffra, Celtis africana, Ziziphus mucronata, Vangueria infausata, Canthium gilfillanii, Engelrophytum magalismontanum, Combretum molle, Acylobotrys capensis, Olea europaea* subsp. *africana* and *Grewia occidentalis*. The understory comprises mainly grass species. This vegetation type is vulnerable, with a conservation target of 24%, less than 1% of which is statutorily conserved (Mucina & Rutherford 2011).

5.1.2 Vegetation of the study area

The site visit indicated that there are two main vegetation communities within the study area, these are grasslands (12.97ha), and the ridge (4.11ha) (Figure 5-4). The area can be further divided into stands of alien trees, primarily *Eucalyptus grandis*, which extend in a line, possibly as a wind break, along the eastern edge of the property (5.4ha). Infrastructure, most of it pre-existing has also been built on the ridge to the south of the site (1.52ha). Much of the ridge area had recently been burnt.

5.1.2.1 Ridge

The ridge vegetation forms an open thicket, with a grassy understory with some herbaceous species and geophytes (Figure 5-1). It is about 5m tall at its tallest. The indigenous trees dominating this vegetation community type are *Vachellia caffra, Celtis africana* and *Dombeya rotundifolia* as relatively large trees and *Euclea crispa* and *Erhetia rigida* forming the shorter trees and shrubs stratum. The basal layer comprised grass species (either dry or burnt) with exposed rocky areas supporting *Boophone disticha, Kohautia amatymbica, Pentanisia angustifolia, Asparagus sp., Ipomoea bathycolops, Scadoxis punicens* and *Aloe zebrina*, among others.

This vegetation type is heavily invaded by a variety of invasive species including *Melia azedarach, Agave sisalana, Agave Americana, Pinus sp., Opuntia ficus-indica, Cercus jamacara*

and *Jacaranda mimosifolia*. The most dominant invasive is *Acacia mearnsii* which forms a dominant tree species on the northern part of the ridge.

Overall, the ridge is degraded, with some species of importance still remaining. Although it does have conservation value if the alien species are carefully managed and indigenous species left to thrive.

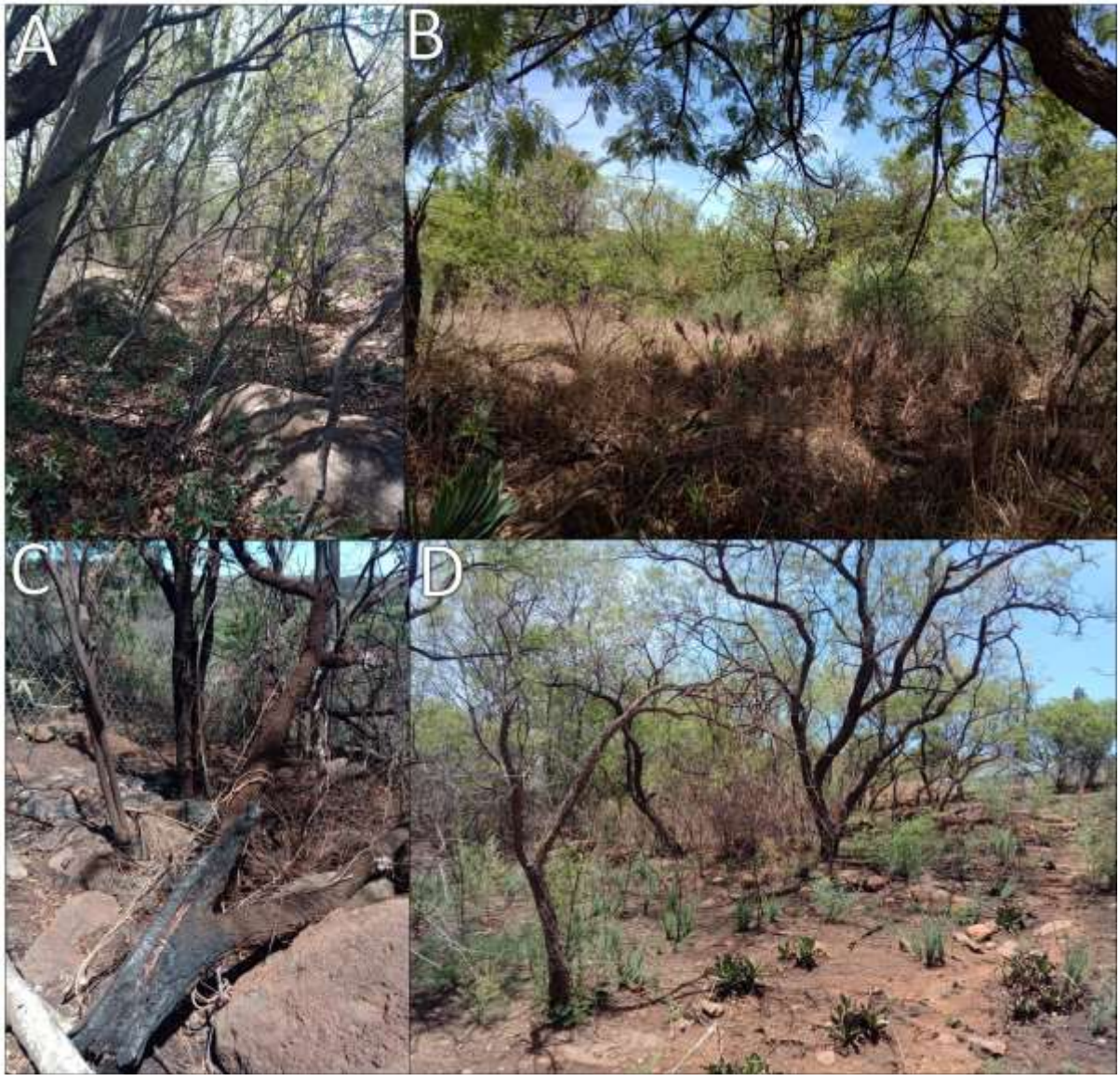

Figure 5-1: Ridge vegetation of the Hope Village Estate study site. A: Open thicket dominated by *Vachellia caffra* and *Celtis Africana*, B: Open thicket dominated by *Acacia mearnsii*, C: Degraded ridge vegetation with recent burning and heavy alien infestation. D: recently burned areas of the ridge with no grass layer.

5.1.2.2 Grassland

The grassland of the study area was dry at the time of the site visit, indicating a late wet season and corresponding late growth period and flowering time for the grasses. Some geophytic species and herbaceous species were present in the grassland (Figure 5-2). Dominant grass species include *Themeda triandra, Pentaschistis curvifolia* and various other dry grass species. Herbaceous species and geophytes recorded from this vegetation include the invasive *Verbena boniariensis* and *Verbena aristigera* along with the indigenous *Asaparagus* sp, *Ledebouria maryinata, Hypoxis hemerocallidea* and *Hilliariella oligocephala*.

The low number of species in the grassland indicates that it has a low conservation value however, it should be noted that additional species, including geophytes and herbaceous species may be recorded at a wetter time of year.

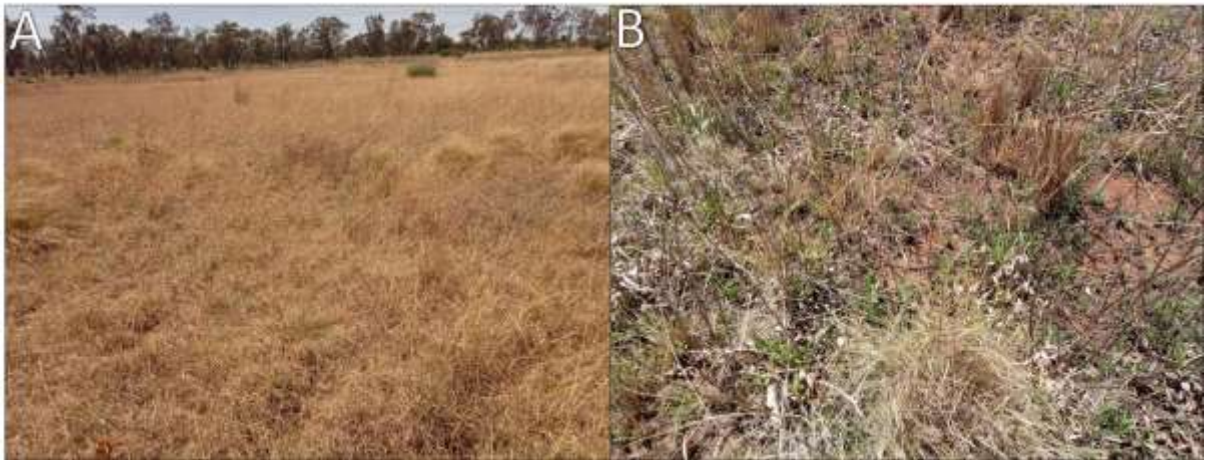

Figure 5-2: Grassland vegetation of the Hope Village Estate study site. A: dry grassland covering much of the site. B: grasses with scattered weedy herbs.

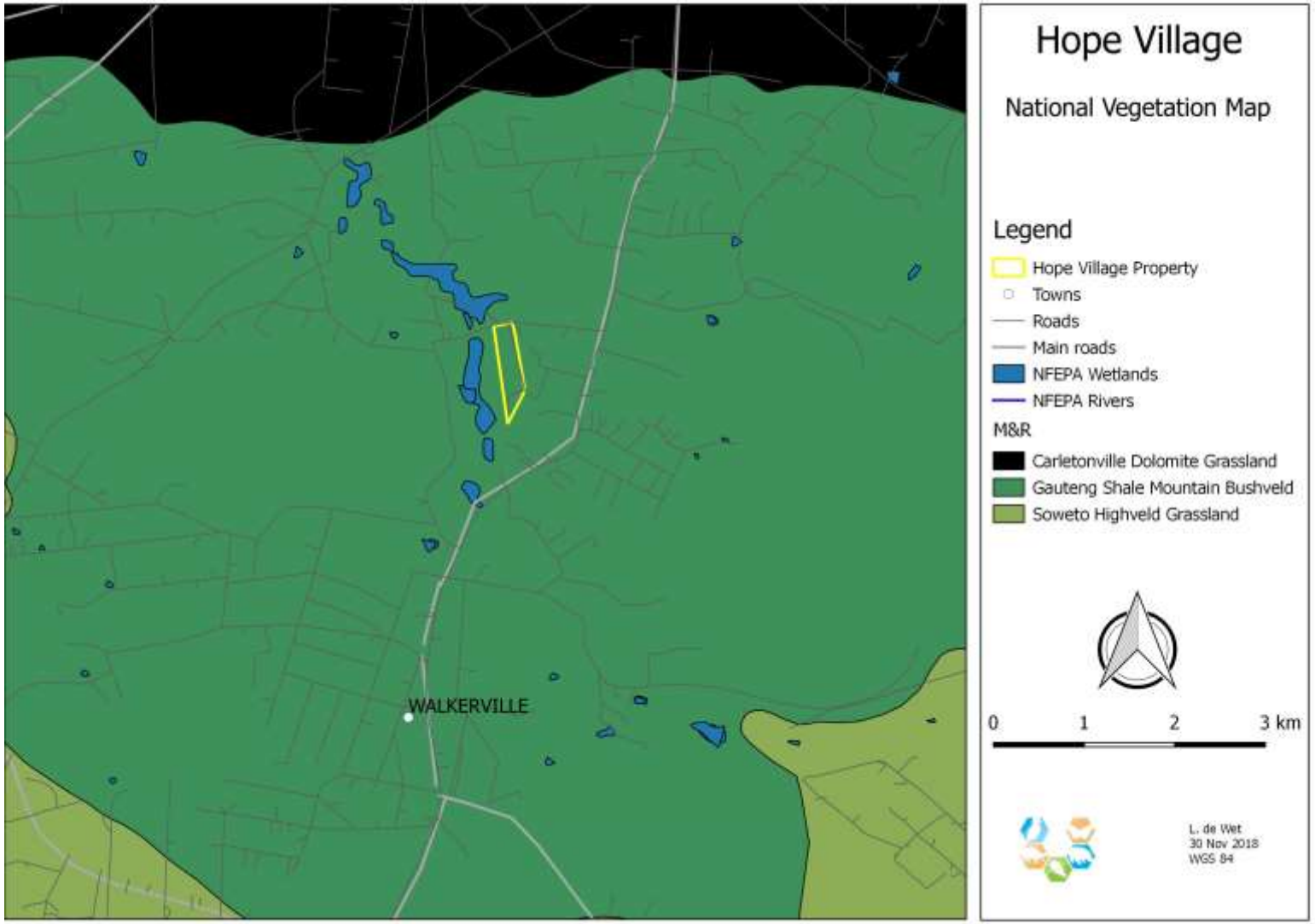

Figure 5-3: National Vegetation Map (Mucina & Rutherford, 2012) for the Hope Village Estate and surrounds.

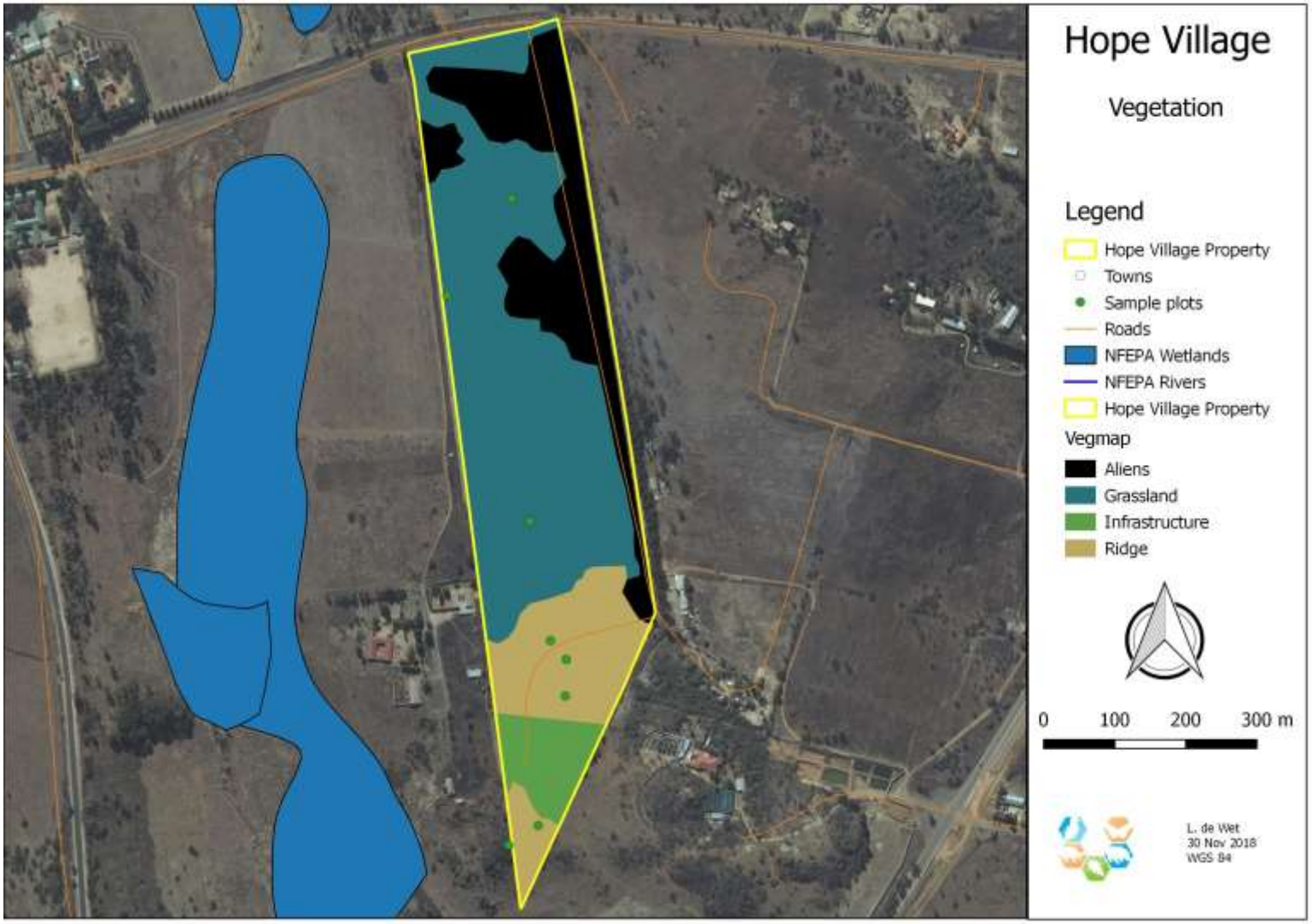

Figure 5-4: Site specific vegetation community map for the Hope Village Estate and surrounds.

5.2 Flora

Overall, the POSA species list includes 374 species (Appendix 2) that occur in the region of the Hope Village site. All of these species are not present in the relatively small area of the study site. The most common families in the study area include:

- Poaceae (Grass family) with 60 species;
- Asteraceae (Daisy family) with 51 species;
- Fabaceae (Pea family) with 42 species;
- Apocynaceae (Dogbane family) with 17 species; and
- Cyperaceae (Sedge family) with 15 species.

The study area comprises both ridge open thicket as well as grassland. Overall, 66 species have been identified from the site (a few species are currently being identified and are not included in this list) (Figure 5-5 and Figure 5-6), species recorded from the study site can be found in the full species list in Appendix 2. Common families recorded from the site include:

- Asteraceae (Daisy family) with 6 species;
- Poaceae (Grass family) with 5 species;
- Asparagaceae (Asparagus family) with 4 species;
- Malvaceae (Mallow family) with 3 species; and
- Solanaceae (Nightshade family) with 3 species.

Tree and shrub species are found exclusively in the rocky ridge areas aside from *Asparagus sp.* and *Vachellia caffra*. Common grass species to both the ridge and grassland areas include *Hyparrhenia* sp. and *Themeda triandra*. *Hermannia depressa* also tends to occur in both the ridge vegetation as well as the grassland in open, bare earth.

Figure 5-5: Herbaceous species recorded from the Hope Village Estate site. A: *Gnidia caffra*, B: *Gerbera viridifolia* C: *Hermannia depressa* and D: *Menodora africana*.

Figure 5-6: Tree and shrub species recorded from the Hope Village Estate site. A: *Celtis africana*, B: *Dombeya rotundifolia* C: *Vangueria parvifolia* and D: *Euclea crispa*.

5.2.1 Species of Special Concern

The expected species list includes 56 Possible Species of Conservation Concern (SCC) (Table 5-1). These species include those species that are listed as Endemic (by POSA), or on one or more of the following lists:

- National Protected Tree List (Government Gazette Vol. 593, 21 November 2014, No. 38215);
- Provincial Protected Species List (Traansvaal Nature Conservation Ordinance No. 12 of 1983);
- National Protected Species List or TOPS (R 1187 of 2007); and
- The National Red List for Plants (redlist.sanbi.org, as given by POSA).

Orange and Red listed species occurring in the region was obtained from CGDARD. According to this list, no Orange or Red listed species have been found on the property. One species: *Lithops lesliei* subsp. *lesliei* has been recorded within 5km of the study site. An additional 5 species have been recorded from within the QDS into which the study area falls. These are:

- *Cineraria longipes*
- *Dioscorea sylvatica*
- *Habenaria mossii*
- *Khadia beswickii*
- *Lepidium mossii.*

None of these species were found on site. However, the habitat is present for these species (grassland and rocky outcrops). A walkthrough prior to construction during the wet season will allow for the identification of any of these listed species. Management includes protected population of these species.

The site visit resulted in the recording of three Confirmed Species of Conservation Concern (Table 5-1), the Schedule 11 listed *Gloriosa superba, Scadoxus puniceus* and *Aloe zebrina.* Other notable species include *Boophone disticha, Hypoxis hemerocallidea, Ledebouria marginata* and *Hypoxis multiceps* (Figure 5-7). It is possible that additional SCC may occur on site and that these would be better seen in a wetter summer season (usually geophytes or other summer flowering groups). It is recommended that a full walk-through of the site be conducted prior to construction to ensure that all SCC have been recorded, and to apply for the required permits for their removal.

Of the possible and confirmed SCC:

- None are listed on the list of nationally Protected Trees;
- None are listed on the National TOPs list;
- 36 species that could possibly occur on site are recorded as endemic by POSA;
- 22 species that could possibly occur on site are listed on the provincial conservation ordinance under Schedule 11, 3 of these species were confirmed during the site visit;

- 4 species that could possibly occur on site are listed as Near Threatened according to the national Red Data list (POSA);
- 3 species that could possibly occur on site are listed as Data Deficient according to the national Red Data list (POSA);
- One species (*Cineraria longipes*) that could possibly occur on site is listed as Vulnerable according to the national Red Data list (POSA); and
- One species (*Pauridia canaliculata*) that could possibly occur on site is listed as Endangered according to the national Red Data list (POSA).

Figure 5-7: SCC occurring on the Hope Village Estate site. A: *Gloriosa superba* B: *Scadoxis puniceus* C: *Aloe zebrina* D: *Boophone disticha* E: *Hypoxis hemerocallidea* F: *Ledebouria marginata* and G: *Hypoxis multiceps*.

Table 5-1: Possible and Confirmed Species of Special Concern that may occur in the general area in and around the Hope Village Estate Site.

Family	Species	POSA	Recorded	Ecology	IUCN	Gauteng	TOPS	Protected Trees
Acanthaceae	*Blepharis stainbankiae*	x		Endemic				
Agapanthaceae	*Agapanthus campanulatus*	x			LC	Sch11		
	Khadia acutipetala	x		Endemic	LC			
Aizoaceae	*Lithops lesliei*	x			NT	Sch11		
	Crinum bulbispermum	x			LC	Sch11		
	Crinum graminicola	x			LC	Sch11		
	Haemanthus humilis	x			LC	Sch11		
Amaryllidaceae	*Scadoxus puniceus*		x			Sch11		
Apiaceae	*Alepidea peduncularis*	x			DD			
	Asclepias fallax	x		Endemic	LC			
	Schizoglossum periglossoides	x		Endemic	LC			
Apocynaceae	*Stenostelma umbelluliferum*	x		Endemic	NT			
	Aloe jeppeae	x			LC	Sch11		
	Aloe verecunda	x		Endemic	LC	Sch11		
	Aloe zebrina		x			Sch11		
	Kniphofia ensifolia	x			LC	Sch11		
Asphodelaceae	*Trachyandra erythrorrhiza*	x		Endemic	LC			
	Afroaster peglerae	x		Endemic	LC			
	Berkheya seminivea	x		Endemic	LC			
	Cineraria longipes	x		Endemic	VU			
	Cotula microglossa	x		Endemic	LC			
	Cotula nigellifolia	x		Endemic	LC			
	Nidorella anomala	x		Endemic	LC			
Asteraceae	*Pseudopegolettia tenella*	x		Endemic				
Brassicaceae	*Lepidium mossii*	x		Endemic	DD			

Family	Species	POSA	Recorded	Ecology	IUCN	Gauteng	TOPS	Protected Trees
Cleomaceae	*Cleome conrathii*	x			NT			
Colchicaceae	*Gloriosa superba*		x			Sch11		
Crassulaceae	*Crassula arborescens*	x		Endemic				
	Crassula setulosa	x		Endemic	NE			
Euphorbiaceae	*Spirostachys africana*	x			LC	Sch11		
Fabaceae	*Lessertia mossii*	x		Endemic	DD			
	Melolobium wilmsii	x		Endemic	LC			
	Pearsonia cajanifolia	x		Endemic	LC			
	Rhynchosia pedunculata	x		Endemic				
Geraniaceae	*Geranium multisectum*	x		Endemic	LC			
Hyacinthaceae	*Eucomis sp.*	x				Sch11		
Hypoxidaceae	*Pauridia canaliculata*	x			EN			
Iridaceae	*Gladiolus crassifolius*	x			LC	Sch11		
	Gladiolus papilio	x			LC	Sch11		
	Gladiolus permeabilis	x			LC	Sch11		
	Gladiolus sericeovillosus	x		Endemic	LC	Sch11		
	Gladiolus sericeovillosus	x			LC	Sch11		
Lobeliaceae	*Cyphia assimilis*	x		Endemic	LC			
Malvaceae	*Hermannia cordata*	x		Endemic	LC			
	Hermannia lancifolia	x		Endemic	LC			
Orchidaceae	*Eulophia hians*	x			LC	Sch11		
	Habenaria bicolor	x			NT	Sch11		
	Habenaria epipactidea	x			LC	Sch11		
Orobanchaceae	*Harveya huttonii*	x		Endemic	LC			
Poaceae	*Sporobolus pectinatus*	x		Endemic	LC			
Polygalaceae	*Polygala illepida*	x		Endemic	LC			
Proteaceae	*Leucospermum cuneiforme*	x		Endemic	LC	Sch11		

Family	Species	POSA	Recorded	Ecology	IUCN	Gauteng	TOPS	Protected Trees
Rubiaceae	*Galium spurium-aparine*	x		Endemic	NE			
Santalaceae	*Thesium deceptum*	x		Endemic	LC			
	Thesium exile	x		Endemic	LC			
	Thesium transvaalense	x		Endemic	LC			
Scrophulariaceae	*Selago capitellata*	x		Endemic	LC			
Thymelaeaceae	*Passerina falcifolia*	x		Endemic	LC			

5.2.2 Alien invasive species

Not all species recorded from the study area and surrounds are indigenous, some of these are not indigenous but have become naturalised. Other species are invasive in nature and legislated by CARA or NEM:BA (Table 5-2 and Table 5-3).

Table 5-2: Conservation of Agricultural Resources Act (CARA) legislation

Category	Restriction
1	Invader plants must be removed and destroyed immediately. No trade in these plants.
2	Invader plants may be grown under controlled conditions in permitted zones. No trade on these plants.
3	Invader plants may no longer be propagated or sold. Existing plants do not need to be removed.

Table 5-3: National Environmental Management: Biodiversity Act (NEM:BA) invasive species legislation.

Restriction	Category 1b	Category 2	Category 3
b. Having in possession or exercising physical control over any specimen of a listed invasive species.	Exempted	Permit required	Exempted
f. Spreading or allowing the spread of any specimen of a listed invasive species.	Prohibited	Permit required	Prohibited

Twenty-one (21) alien invasive species are expected to be found in and around the Hope Village site. of these, 16 are listed under CARA, and 19 under NEM:BA (Figure 5-8: Some of the alien invasive plant species recorded from the Hope Village site. A: *Acacia mearnsii*, B: *Melia azedararch*, C: *Opuntia ficus-indica* and D: *Cerceus jamacara*.

Table 5-4, Figure 5-8). All of the species these non-indigenous species recorded from the Hope Village site are invasive and must be controlled.

Figure 5-8: Some of the alien invasive plant species recorded from the Hope Village site. A: *Acacia mearnsii*, B: *Melia azedararch*, C: *Opuntia ficus-indica* and D: *Cerceus jamacara*.

Table 5-4: Alien invasive species both expected (according to POSA) and recorded from the Hope Village site.

Species	Common name	Expected	Present	CARA	NEMA
Acacia dealbata	Silver wattle	x		2	2
Acacia mearnsii	Black wattle		x	2	2
Achyranthes aspera	Burweed	x		1	
Agave sisalana	Sisal		x	2	2
Alisma plantago-aquatica	Mud plantain	x			1b
Cereus jamacaru	Queen of the night		x	1	1b
Cuscuta campestris	Common dodder	x		1	1b
Datura stramonium	Common thorn apple	x		1	1b
Eucalyptus grandis	Saligna gum		x	2	1b
Jacaranda mimosifolia	Jacaranda		x	3	1b
Melia azedarach	Seringa		x	3	1b
Nasturtium officinale	Watercress	x			2
Opuntia ficus-indica	Prickly-pear		x	1	1b
Phytolacca dioica	Belhambra		x	3	3
Phytolacca octandra	Forest inkberry	x			1b
Pinus sp.	Pine		x	2	
Ricinus communis	Castor-oil plant	x		2	2
Solanum mauritianum	Bugweed		x	1	1b
Solanum sisymbriifolium	Wild tomato	x	x	2	1b
Solanum sp.			x		1b
Verbena bonariensis	Purple top		x		1b

6 Sensitivity Assessment

Sensitivity was based on a set of criteria, scored based on various measures and then calculated within a matrix, an overall sensitivity is then assigned based on the total score. The sensitivity assessment was done on each of the vegetation communities of the site. As the monotypic alien stands occur within the grassland community, these were included in that community to fully assess the sensitivity, and the infrastructure area was included in the ridge vegetation community. The results of the sensitivity calculation can be seen in Table 6-1 and Table 6-2. The results are shown in Figure 6-1.

The area of the ridge within the Hope Village site is 5.63ha including the infrastructure currently on it. Of this, the infrastructure takes up 27% of the Hope Village site area of the ridge, with the ridge forming 73% of the area. If the whole ridge is taken into account (as mapped in Figure 4-1), this means that over 4ha of contiguous ridge habitat including areas of the ridge outside the Hope Village Site is present. However, the definition of "natural" is problematic as much of this vegetation is invaded, primarily by *Acacia mearnsii* but also by various others including *Phytolacca dioica, Jacaranda mimosifolia* and *Cereus jamacrara*. These invasive species constitute at least 40% of the canopy cover of the vegetation. However, considering the dryness of the wet season during the site visit and the presence of habitat for a variety of SCC, as well as applying the precautionary principle: this would indicate that the ridge comprises over 4ha of contiguous natural vegetation (including those areas of the ridge outside of the Hope Village site).

As per the guidelines, with a Class three ridge significantly impacted by anthropogenic activities, then Class 4 guidelines must be followed. Thus; the subdivision of the property will not be permitted, and further development activities will not be permitted in areas of the ridge where the remaining contiguous extent of natural habitat is 4ha or more. Within the Hope Village site, the areas of the ridge that are natural do not reach a contiguous 4ha. However, when taken in conjunction with the rest of the ridge as a habitat, the area of natural habitat would constitute 4ha or more.

Table 6-1: Sensitivity score for the grassland (including the alien vegetation) of the Hope Village site

Criteria	Rating	Score	Weighted score
Species of Conservation Concern	0 to 5	2	2
Sensitive Habitats	0-20	1	1
Critical Biodiversity Areas	CBA	5	5
Level of Degradation	11	4	4
Indigenous Vegetation	61-80%	4	4
Proximity to watercourses	>100m	1	0.7
Proximity to wetlands	>100m	1	0.7
Proximity to National Parks	>10kms	1	0.4
Proximity to other Protected Areas	>10kms	1	0.4
Proximity to NPAES Focus Areas	>10kms	1	0.7

Criteria	Rating	Score	Weighted score
Proximity to IBAs	>10kms	1	0.4
Proximity to Ramsar sites	>10kms	1	0.4
Proximity to World Heritage Sites	>10kms	1	0.4
Proximity to Threatened Ecosystems	2.5-5kms	3	2.1
		TOTAL SCORE	22.2
		as a /49 percentage	45.31
		Sensitivity rating	Low

Table 6-2: Sensitivity score for the ridge (including the infrastructure) of the Hope Village site

Criteria	Rating	Score	Weighted score
Species of Conservation Concern	0 to 5	2	2
Sensitive Habitats	61-80	4	4
Critical Biodiversity Areas	CBA	5	5
Level of Degradation	11	4	4
Indigenous Vegetation	41-60%	3	3
Proximity to watercourses	>100m	1	0.7
Proximity to wetlands	>100m	1	0.7
Proximity to National Parks	>10kms	1	0.4
Proximity to other Protected Areas	>10kms	1	0.4
Proximity to NPAES Focus Areas	>10kms	1	0.7
Proximity to IBAs	>10kms	1	0.4
Proximity to Ramsar sites	>10kms	1	0.4
Proximity to World Heritage Sites	>10kms	1	0.4
Proximity to Threatened Ecosystems	2.5-5kms	3	2.1
		TOTAL SCORE	24.2
		as a /49 percentage	49.39
		Sensitivity rating	Moderate

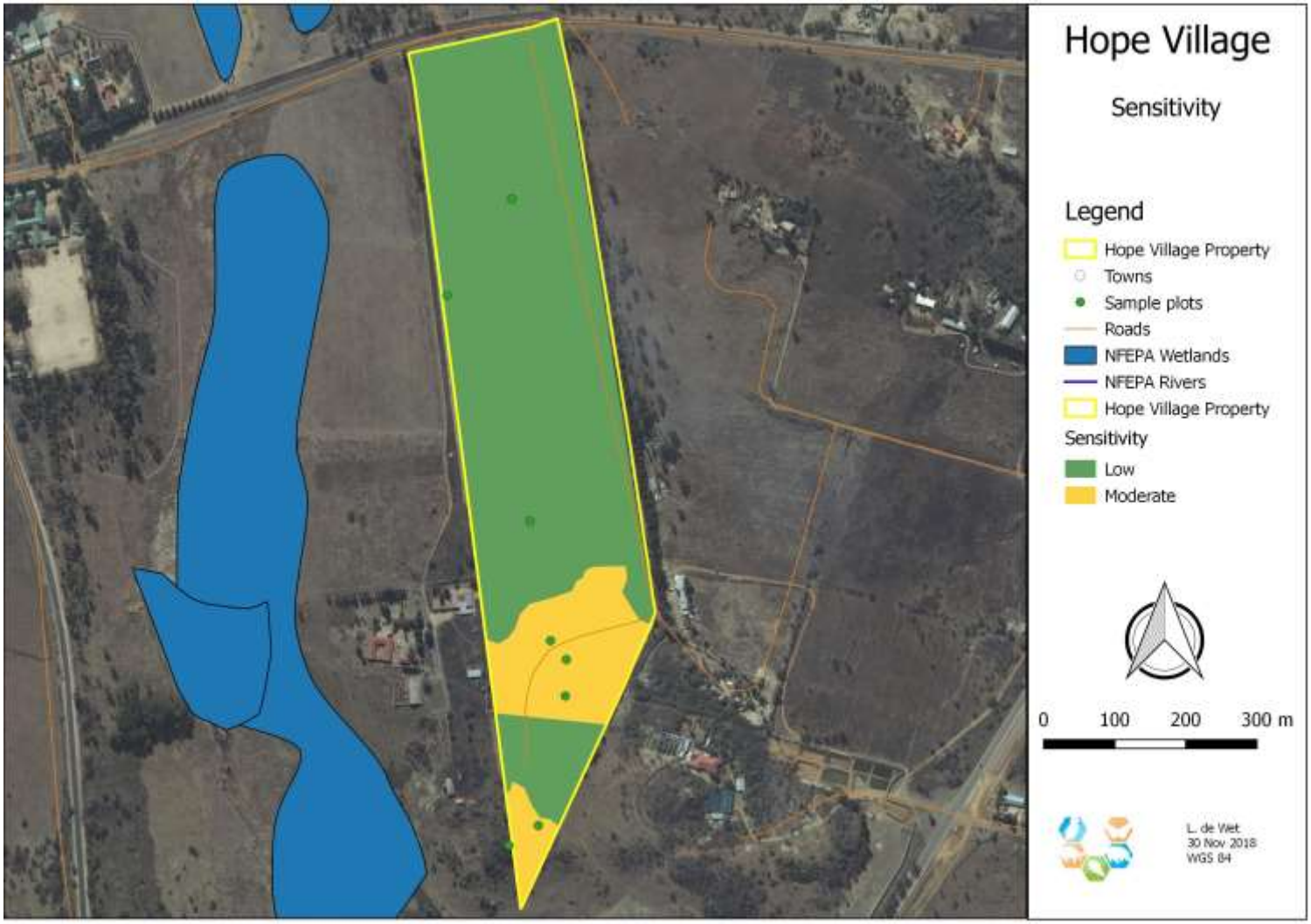

Figure 6-1: Sensitivity map for the Hope Village Estate and surrounds.

7 Impact Assessment

The impacts for the proposed development have been rated according to the methodology in Section 3.4. There are three issues and six impacts overall, and mitigation measures are recommended for each of the impacts.

7.1 Issue 1: Loss of vegetation communities

7.1.1 Impact 1: Loss of grassland

Cause and comment: The building of the Hope Village estate will result in the complete loss of the grassland as the plans allow for landscaping, but not the retention of the natural vegetation. This will result in the loss of 18.37ha of vegetation, 24% of which is predominantly alien species (*Eucalyptus grandis*), with 12.97ha of natural grassland lost due to the proposed development. This grassland is sandwiched between a wetland on the western side of the property, (with associated slightly different moist grassland) and a rocky outcrop comprising much of the slope of the adjacent property on the east of the site. As a result, this grassland is a relatively isolated patch of Soweto Highveld Grassland. However, the degraded nature of the grassland and its low species numbers, along with other factors, indicate that it has a low sensitivity.

Significance statement: The impact will be permanent, restricted to the study area and definite, with a moderate severity resulting in a moderate negative overall significance. As the full extent of the grassland within the site will be lost (12.97ha), the impact would remain moderate negative, even with mitigation measures. However, Considering the degraded low sensitivity of this grassland, coupled with the overall area of 12.97ha, this impact is considered to be within the limits of acceptable change.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Study Area	Moderate	Definite	MODERATE-
With Mitigation	Permanent	Study Area	Moderate	Definite	MODERATE-

Mitigation and Management:

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation. Avoid any construction or related activity occurring within the grasslands outside of the property.

7.1.2 Impact 2: Loss of ridge open thicket

Cause and comment: The building of Hope Village Estate based on the current plan will result in the loss of the full area of the ridge within the Hope Village site. This includes the 4.11ha of ridge within the site. Considering the sensitivity of the ridge associated with the presence of sensitive habitats (rocky outcrops) and the ridge guidelines that allow for no development on such ridges (see section 6 above), it is recommended that the development of the area of ridge on the Hope Village site is avoided altogether. These areas should be managed for conservation (and could form part of conservation training for the facility), including the control and monitoring of alien invasive species.

Significance statement: The impact will be permanent, regional (based on the distribution of ridges) and definite, with a severe severity resulting in a high negative overall significance. As the full extent of the ridge within the site will be lost, the impact will remain a high negative. Considering the degraded nature of the ridge, the presence of 40% cover of alien species, and using the precautionary principle, the presence of the ridge as a CBA, and the ridge guidelines that indicate that no development should occur in the ridges, this impact is considered to be outside the limits of acceptable change. As such, development of the ridge should be avoided, and as a result the impact will be negligible.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Regional	Severe	Definite	HIGH-
With Mitigation	Permanent	Regional	Severe	Definite	HIGH-
Avoid Development of Ridge (recommended)	No Impact				

Mitigation and Management:

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation. Avoid any construction or related activity occurring within the grasslands outside of the property.
- The ridge should be demarcated as a no-go area and managed as a conservation area or open space within the development.

7.2 Issue 2: Loss of Species of Conservation Concern and Biodiversity

7.2.1 Impact 3: Loss of Species of Conservation Concern

Cause and comment: The building of the Hope Village Estate will result in the loss of SCC. Three SCC were recorded within the site during this site visit, with the likelihood of additional species being recorded after higher rainfall events during the growing season. These species will be lost during the construction of the development.

Significance statement: The impact will be permanent, restricted to a localised area and definite, with a moderate severity resulting in a moderate negative overall significance. Mitigation measures can reduce this impact to a low negative overall significance.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Regional	Moderate	Definite	MODERATE-
With Mitigation	Permanent	Localised	Slight	May occur	LOW-

Mitigation and Management:

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation.
- Any populations of SCC should be avoided wherever possible, where they cannot be avoided, every effort should be made to replant these individuals elsewhere in the landscaped gardens, or plant an equivalent or greater number of new individuals elsewhere in the gardens;
- A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation.

Impact 4: Loss of biodiversity in general

Cause and comment: As the construction of the Hope Village Estate will result in the loss of the natural vegetation of the site, this will in turn result in the loss of the species occurring within the site.

Significance statement: The impact will be permanent, restricted to the study area and definite, with a moderate severity resulting in a moderate negative overall significance. Mitigation will result in the reduction of the impact to a low negative, which is within the limits of acceptable change.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Study Area	Moderate	Definite	MODERATE-
With Mitigation	Permanent	Localised	Slight	May occur	LOW-

Mitigation and Management:

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to use the surrounding natural vegetation as a toilet, for dumping or as picnic sites.
- Where possible at least one (comprising the ridge) corridor of natural vegetation should be incorporated into the design of the estate to allow for the retention of biodiversity within the site.
- Any populations of SCC should be avoided wherever possible, where they cannot be avoided, every effort should be made to replant these individuals elsewhere in the gardens or plant an equivalent or greater number of new individuals elsewhere in the gardens.
- A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation.

7.3 Issue 3: Ecosystem function and Process

7.3.1 Impact 5: Fragmentation

Cause and comment: This site is prone to fragmentation due to its location between a wetland (and associated moist grassland) to the west and a rocky outcrop to the east. The site forms a small patch of grassland between different ecosystems. As such, the loss of the grassland will result in fragmentation of this already partially fragmented system. In addition, any loss of the ridge would further fragment this ecosystem. Fragmentation can result in the loss of biodiversity due to loss of dispersal, pollination and gene issues, among other considerations. It should be avoided where possible.

Significance statement: The impact will be permanent, restricted to a regional area and definite, with a moderate severity resulting in a moderate negative overall significance. Mitigation measures can reduce this impact to a low negative overall significance, an impact within the limits of acceptable change.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Regional	Moderate	Definite	MODERATE-
With Mitigation	Permanent	Localised	Slight	Unlikely	LOW-

Mitigation and Management:

- Refer to mitigation measures listed under impact 3 above.

7.3.2 Impact 6: Invasion of alien species

Cause and comment: The building of the Hope Village Estate will result in the influx of seeds and disturbance of existing seedbanks of alien invasive species. Considering the number of alien species already recorded from the site, this impact will occur and must be managed.

Significance statement: The impact will be permanent, restricted to a regional area and definite, with a moderate severity resulting in a moderate negative overall significance. Mitigation measures can reduce this impact to a low negative overall significance and if an invasive alien management plan is applied this can even become a beneficial impact of low significance.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Impact 4: Fragmentation of vegetation and edge effects					
Without Mitigation	Permanent	Regional	Moderate	Definite	MODERATE-
With Mitigation	Permanent	Localised	Slight	Unlikely	LOW-

Mitigation and Management:

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation.
- Any existing and new alien species must be removed as soon as possible after emergence.
- An alien vegetation management plan must be applied to the site to maintain the site free of alien invasions throughout the construction and operational phase of the development.

8 Conclusions and Recommendations

The site comprises degraded grassland and ridge open thicket vegetation and is largely invaded by alien species. The site is situated largely within a CBA with some ESA areas, but the sensitivity of the existing vegetation is not particularly high. It is likely that additional SCC will be recorded from the site during a wetter time period. It is recommended that an additional site visit (in the form of a walkthrough prior to construction) be undertaken in summer to identify any SCC that may have been missed so that the relevant permits for their removal can be applied for. It is also recommended that the ridge land use guidelines are applied in this case and that areas of the ridge are set aside as conservation corridors within the site to ensure connectivity and conservation of a sensitive habitat.

Impacts in general are medium negative and can be reduced to low negative with appropriate mitigations measures (Table 8.1). Impacts associated with the loss of the ridge are a high negative and above the limits of acceptable change, indicating that the ridge areas be avoided.

Table 8.1: Summary of impacts associated with the Hope Village Estate.

Impact	Without Mitigation	With mitigation
Issue 1: Loss of vegetation communities		
1: Loss of grassland	Moderate -	Moderate -
2: Loss of ridge open thicket*	High -	High -
Issue 2: Loss of Species of Conservation Concern and Biodiversity		
3: Loss of Species of Conservation Concern	Moderate -	Low -
4: Los of biodiversity in general	Moderate -	Low -
Issue 3: Ecosystem function and process		
5: Fragmentation	Moderate -	Low -
6: Invasion of alien species	Moderate -	Low -

*No impact will occur if the ridge is avoided, as per recommendation

8.1 Mitigation and management

- Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation.
- Avoid any construction or related activity occurring within the grasslands outside of the property as part of this development, including dumping, use of the grassland as a toilet, harvesting of plants etc...
- The ridge should not be further developed but rather managed as a conservation area or open space within the development.
- Any populations of SCC should be avoided wherever possible, where they cannot be avoided, every effort should be made to replant these individuals elsewhere in the landscaped gardens, or plant an equivalent or greater number of new individuals elsewhere in the gardens;

- A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation.
- Where possible at least one (comprising the ridge) corridors of natural vegetation should be incorporated into the design of the estate to allow for the retention of biodiversity within the site.
- Any existing and new alien species must be removed as soon as possible after emergence.
- An alien vegetation management plan must be applied to the site to maintain the site free of alien invasions throughout the construction and operational phase of the development.

8.2 Recommendations

It is the opinion of the specialist that the proposed development should go ahead, provided the following criteria are met:

5) The layout of the estate is adjusted to form natural corridors comprising, at the very least, the ridge areas but ideally including a grassland corridor as well;
6) Any and all corridors should be managed as conservation areas including alien vegetation control. They may be used as education areas;
7) The development and implementation of an alien invasive management plan for the site;
8) Permits must be obtained for each of the plant species that will be destroyed where required, this must be done by a qualified professional; and

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10 APPENDIX 1: Specialist CV

23 John Nettleton Place
Kloof
Durban

Leigh-Ann de Wet
MSc | Pri. Sci. Nat.
Biodiversity Specialist

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083 352 1936

Profile

A biodiversity specialist with a history in botanical research, biodiversity assessments and associated planning in developing countries. Possesses experience in classification of ecosystems and development of management and monitoring plans for a variety of ecosystems from the spiny thicket of Madagascar to the Rainforests of West and Central Africa. Experience also includes Biodiversity Assessments (comprising classification and mapping of ecosystems and habitats) of ecosystems and vegetation types throughout Southern Africa including grasslands, forests, thicket, bushveld and fynbos with associated conservation and management recommendations.

Key Expertise

Ecological research methodology development	Report and paper writing
Ecological research	Synthesis of specialist work into integrated assessments
Habitat and vegetation mapping	Ecological statistics
Habitat and vegetation classification	Environmental Management and Monitoring

Education

2005 - 2007	**MSc** in Botany – Rhodes University
2005	**BSc Honours** in Botany (with Distinction) – Rhodes University
2001 - 2004	**BSc** (Botany and Entomology) – Rhodes University

Courses

2013	Wetland Management: Introduction to Law – University of the Free State
2013	Wetland Management: Introduction and Delineation Short Course – University of the Free State
2011	Land Degradation Short Course – Rhodes University
2009	EIA Short Course – Rhodes University and Coastal and Environmental Services

Membership

2012 – Present	Professional Natural Scientist with SACNASP: Ecological Science (No. 400233/12)
2012 – Present	High Conservation Value Assessor (plants) with the Round Table of Sustainable Biofuels.
2013 – Present	South African Association of Botanists

2013 – Present	Botanical Society of South Africa
2013 – Present	Wildlife and Environment Society of South Africa
2013	Grasslands Society of Southern Africa

Professional experience

2014 - Current Owner of LD Biodiversity Consulting – Biodiversity Specialist

Started own company (Sole Proprietor) to focus on Ecological Assessments including baseline assessments (habitat and ecosystem classification) as well as Management and Monitoring for large projects. Responsibilities include:

- Ecological Surveys including Baseline Assessments, Biodiversity Management and Monitoring Plans and Spatial Planning for biodiversity goals to meet international standards
- Offset design
- Strategic Environmental Planning
- Mapping (QGIS)
- Research
- Financial Management

2012 - 2014 Digby Wells Environmental – Unity Manager: Biophysical

Management of the Biophysical Department, specifically Flora and Fauna although included the overseeing and review of both Freshwater Ecology and Wetlands as well. Responsibilities includeed:

- Conducting and management of Ecological Baseline and Impact Assessments to meet international standards
- Biodiversity Management and Monitoring Plans
- Management of a team of between four and seven colleugues and specialists

2009 – 2012 Coastal and Environmental Services – Senior Environmental Consultant and Ecological Specialist

Ecological specialist responsible for conducting ecological assessments including baseline and impact assessments for Fauna and Flora. Later in this time for overseeing junior ecologists and training. Key responsibilities included:

- Conducting Ecological Baseline and Impact Assessments to international standards
- Strategic environmental planning
- Managing teams of specialists
- Mapping (Arc)
- Research

2007 - 2009 Rhodes University (South Africa) and Sheffield University (England) – NERC Research Assistant

Design and conducting of a large common or garden experiement looking at the effects of global climate change on grassland compoisition. Key responsibilities included:

- Experimental design
- Experiment implementation

- Data analyses

Awards

2005	Best Young Botanist second prize for a presentation entitled: "Population biology and effects of harvesting on *Pelargonoium reniforme* (Geraniaceae) in Grahamstown and surrounding areas" at the SAAB conference. Dean's list, Academic Colours, Masters Scholarship.
2004	Putterill Prize for conservation in the Eastern Cape, Dean's list, Academic Half Colours, Honours Scholarship.
2001 - 2003	Dean's List

Publications

de Wet, L., Downsborough, L., Reimers, B., and Weah, C. (in prep). Traditional ecological knowledge and social survey as a proxy for large mammal scientific survey in Liberia.

de Wet, L., Downsborough, L., Reimers, B., and Weah, C (in prep). Traditional ecological knowledge and presence of large mammals in Liberia: a case study.

de Wet, L., and Downsborough, L. (in prep). A case for using traditional knowledge for community managed multiple use conservation areas in Liberia.

Taylor, S, Ripley, B, Martin, T, **de Wet, L,** Woodward, I and Osborne, C (2014.) Physiological advantages of C4 grasses in the field: a comparative experiment demonstrating the importance of drought. Global Change Biology – in Press.

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de Wet LR, Barker NP and Peter CI (2008). The long and the short of gene flow and reproductive isolation: Inter-Simple Sequence Repeat (ISSR) markers support the recognition of two floral forms in *Pelargonium reniforme* (Geraniaceae). Biochemical Systematics and Ecology 36: 684-690.

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de Wet LR and Botha CEJ (2007). Resistance or tolerance: An examination of aphid (*Sitobion yakini*) phloem feeding on Betta and Betta-Dn wheat (*Triticum aestivum* L.). South African Journal of Botany 73(1): 35-39.

de Wet L (2005). Is *Pelargonium reniforme* in danger? The effects of harvesting on *Pelargonium reniforme*. Veld & Flora. December: 182-184.

Presentations

2013 **LR de Wet** – Biodiversity Actions Plans for existing mines: Making them Work for Grassland Conservation - Grassland Society of Southern Africa Congress, Limpopo

2011 **LR de Wet** - Finding Ecological Benefits of Windfarms – Thicket Forum, Grahamstown

2010 Lubke, RA, N Davenport, **LR de Wet** and C Fordham – The ecology and distribution of endorheic pans in the subtropical thicket vegetation near Port Elizabeth, Eastern Cape, South Africa – International Association for Vegetation Science, 53rd Annual Symposium, Ensenada, Mexico.

2006 **LR de Wet,** Barker, N and Peter, C – Pollinator-mediated selection in *Pelargonium reniforme* as described by Inter Simple Sequence Repeat markers. – South African Association of Botanists (SAAB) conference.

2006 **LR de Wet**, Barker, N and Peter, C– Pollinator-mediated selection of *Pelargonium reniforme* and two floral morphs described by inter simple sequence repeat markers – Southern African Society for Systematic Biology (SASSB) conference.

2005 **LR de Wet** and Vetter, S – Population biology and effects of harvesting on *Pelargonium reniforme* (Geraniaceae) in Grahamstown and surrounding areas, Eastern Cape, South Africa – South African Association of Botanists (SAAB) conference.

2005 **LR de Wet** and Vetter, S – Harvesting of *Pelargonium reniforme* in Grahamstown; what are the implications for populations of the plant? – Thicket Forum

2005 **LR de Wet** – Harvesting of *Pelargonium reniforme* in Grahamstown; what are the implications for populations of the plant? – Annual general meeting. Botanical Society of South Africa, Albany Branch.

2004 **LR de Wet** – Population biology of *Pelargonium reniforme* – Annual general meeting. Botanical Society of South Africa, Albany Branch.

11 APPENDIX 2 – Expected Plant Species

Family	Species	Recorded	POSA
Acanthaceae	*Barleria macrostegia*		x
	Barleria obtusa		x
	Blepharis stainbankiae		x
	Crabbea acaulis		x
Agapanthaceae	*Agapanthus campanulatus*		x
Agavaceae	*Chlorophytum bowkeri*		x
	Chlorophytum fasciculatum		x
Aizoaceae	*Delosperma sp.*		x
	Hereroa sp.		x
	Khadia acutipetala		x
	Lithops lesliei		x
	Mossia intervallaris		x
Alismataceae	*Alisma plantago-aquatica*		x
Alliaceae	*Tulbaghia leucantha*		x
Amaranthaceae	*Achyranthes aspera*		x
	Amaranthus muricatus		x
	Chenopodium album		x
	Chenopodium schraderianum		x
	Chenopodium sp.		x
	Chenopodium stellulatum		x
Amaryllidaceae	*Boophone disticha*	x	
	Crinum bulbispermum		x
	Crinum graminicola		x
	Haemanthus humilis		x
	Scadoxis punicens	x	
Anacardiaceae	*Searsia discolor*		x
	Searsia lancea	x	
	Searsia leptodictya		x
	Searsia magalismontana		x
	Searsia rigida	x	x
Apiaceae	*Afrosciadium magalismontanum*		x
	Alepidea peduncularis		x
	Bupleurum mundii		x
	Heteromorpha arborescens		x
Apocynaceae	*Ancylobotrys capensis*		x
	Asclepias adscendens		x
	Asclepias aurea		x
	Asclepias eminens		x
	Asclepias fallax		x

Family	Species	Recorded	POSA
	Asclepias fulva		x
	Asclepias gibba		x
	Aspidoglossum biflorum		x
	Aspidoglossum lamellatum		x
	Cordylogyne globosa		x
	Gomphocarpus sp.	x	
	Pachycarpus schinzianus		x
	Parapodium costatum		x
	Pentarrhinum insipidum	x	
	Raphionacme hirsuta		x
	Raphionacme velutina		x
	Schizoglossum periglossoides		x
	Stenostelma umbelluliferum		x
	Xysmalobium undulatum		x
Aquifoliaceae	*Ilex mitis*		x
Asparagaceae	*Agave americana*	x	
	Agave sisalana	x	
	Asparagus cooperi	x	x
	Asparagus laricinus	x	x
	Asparagus setaceus		x
	Asparagus suaveolens		x
Asphodelaceae	*Aloe jeppeae*		x
	Aloe marlothii		x
	Aloe sp.		x
	Aloe verecunda		x
	Aloe zebrina	x	
	Bulbine narcissifolia		x
	Kniphofia ensifolia		x
	Trachyandra erythrorrhiza		x
	Trachyandra laxa		x
	Trachyandra saltii		x
Asteraceae	*Afroaster peglerae*		x
	Afroaster serrulatus		x
	Athrixia angustissima		x
	Athrixia elata		x
	Athrixia phylicoides		x
	Barkheya zeyheri	x	
	Berkheya seminivea		x
	Berkheya zeyheri		x
	Brachylaena sp.		x
	Cineraria aspera		x
	Cineraria longipes		x
	Cineraria lyratiformis		x

Family	Species	Recorded	POSA
	Conyza podocephala		x
	Cotula coronopifolia		x
	Cotula microglossa		x
	Cotula nigellifolia		x
	Crepis hypochaeridea		x
	Denekia capensis		x
	Dimorphotheca spectabilis		x
	Felicia filifolia	x	x
	Garuleum woodii		x
	Gazania sp.	x	
	Gerbera viridifolia	x	
	Haplocarpha scaposa	x	
	Helichrysum aureum		x
	Helichrysum caespititium		x
	Helichrysum cephaloideum		x
	Helichrysum chionosphaerum		x
	Helichrysum harveyanum		x
	Helichrysum kraussii		x
	Helichrysum lepidissimum		x
	Helichrysum mundtii		x
	Helichrysum nudifolium		x
	Helichrysum rugulosum		x
	Helichrysum setosum		x
	Hilliaraella oligocephala	x	
	Hilliardiella aristata		x
	Hilliardiella elaeagnoides		x
	Hilliardiella hirsuta		x
	Hilliardiella sutherlandii		x
	Lopholaena coriifolia		x
	Nidorella anomala		x
	Osteospermum scariosum		x
	Phymaspermum athanasioides		x
	Pseudopegolettia tenella		x
	Schistostephium crataegifolium		x
	Schkuhria pinnata		x
	Senecio asperulus		x
	Senecio coronatus		x
	Senecio harveianus		x
	Senecio hieracioides		x
	Senecio lydenburgensis		x
	Senecio sp.		x
	Tagetes minuta		x
	Tarchonanthus camphoratus		x

Family	Species	Recorded	POSA
	Ursinia nana		x
Bignoniaceae	*Jacaranda mimosifolia*	x	
	Tecomaria capensis	x	
Boraginaceae	*Cynoglossum hispidum*		x
	Erhetia ridiga	x	
Brassicaceae	*Lepidium mossii*		x
	Nasturtium officinale		x
	Rorippa nudiuscula		x
Cactaceae	*Cereus jamacara*	x	
	Opuntia ficus-indica	x	
Cannabaceae	*Celtis africana*	x	
Caryophyllaceae	*Dianthus mooiensis*		x
	Pollichia campestris		x
Celastraceae	*Gymnosporia polyacantha*	x	
	Maytenus c.f. tenuispina	x	
	Pterocelastrus echinatus		x
Cleomaceae	*Cleome conrathii*		x
	Cleome maculata		x
	Cleome monophylla		x
Colchicaceae	*Gloriosa superba*	x	
Combretaceae	*Combretum erythrophyllum*		x
Commelinaceae	*Cyanotis speciosa*		x
Convolvulaceae	*Cuscuta campestris*		x
	Falkia oblonga		x
	Ipomoea bathycolpor	x	
	Ipomoea crassipes		x
	Ipomoea oblongata		x
Crassulaceae	*Cotyledon orbiculata*	x	
	Crassula alba		x
	Crassula arborescens		x
	Crassula capitella		x
	Crassula setulosa		x
Cucurbitaceae	*Coccinia adoensis*		x
	Cucumis hirsutus		x
	Cucumis zeyheri		x
	Kedrostis africana		x
Cyperaceae	*Abildgaardia ovata*		x
	Bulbostylis burchellii		x
	Cyperus congestus		x
	Cyperus denudatus		x
	Cyperus longus		x
	Cyperus obtusiflorus	x	x
	Fimbristylis complanata		x

Family	Species	Recorded	POSA
	Fuirena coerulescens		x
	Fuirena pubescens		x
	Isolepis cernua		x
	Isolepis costata		x
	Isolepis fluitans		x
	Kyllinga pulchella		x
	Schoenoplectus muriculatus		x
	Scirpoides burkei		x
Droseraceae	*Drosera burkeana*		x
Ebenaceae	*Diospyros austro-africana*		x
	Diospyros lycioides		x
	Euclea crispa	x	x
Ericaceae	*Erica drakensbergensis*		x
	Erica woodii		x
Euphorbiaceae	*Acalypha angustata*		x
	Ricinus communis		x
	Spirostachys africana		x
Fabaceae	*Abrus laevigatus*		x
	Acacia caffra	x	
	Acacia dealbata		x
	Acacia mearnsii	x	
	Argyrolobium rupestre		x
	Argyrolobium tuberosum		x
	Crotalaria distans		x
	Dichilus lebeckioides		x
	Dichilus strictus		x
	Elephantorrhiza elephantina		x
	Eriosema burkei		x
	Erythrina zeyheri		x
	Indigastrum burkeanum		x
	Indigastrum fastigiatum		x
	Indigofera dimidiata		x
	Indigofera hedyantha		x
	Indigofera hilaris		x
	Indigofera obscura		x
	Indigofera oxytropis		x
	Indigofera zeyheri		x
	Lablab purpureus		x
	Leobordea foliosa		x
	Lessertia mossii		x
	Lotononis macrosepala		x
	Macrotyloma axillare		x
	Melolobium wilmsii		x

Family	Species	Recorded	POSA
	Mundulea sericea		x
	Pearsonia cajanifolia		x
	Rhynchosia adenodes		x
	Rhynchosia nervosa		x
	Rhynchosia pedunculata		x
	Rhynchosia reptabunda		x
	Rhynchosia sordida		x
	Rhynchosia totta		x
	Senegalia caffra		x
	Senegalia hereroensis		x
	Tephrosia longipes		x
	Tephrosia semiglabra		x
	Trifolium africanum		x
	Vicia sativa		x
	Vigna vexillata		x
	Zornia linearis		x
Geraniaceae	*Geranium multisectum*		x
	Monsonia angustifolia		x
	Pelargonium sidoides		x
Gunneraceae	*Gunnera perpensa*		x
Hyacinthaceae	*Drimia angustifolia*		x
	Eucomis sp.		x
	Ledebouria cooperi		x
	Ledebouria inquinata		x
	Ledebouria marginata	x	
Hypericaceae	*Hypericum aethiopicum*		x
Hypoxidaceae	*Hypoxis acuminata*		x
	Hypoxis hemerocallidea	x	
	Hypoxis multiceps	x	x
	Pauridia canaliculata		x
Iridaceae	*Babiana bainesii*		x
	Gladiolus crassifolius		x
	Gladiolus papilio		x
	Gladiolus permeabilis		x
	Gladiolus sericeovillosus		x
	Gladiolus sericeovillosus		x
	Moraea pallida		x
	Moraea simulans		x
	Tritonia nelsonii		x
Juncaceae	*Juncus exsertus*		x
	Juncus oxycarpus		x
Lamiaceae	*Ajuga ophrydis*		x
	Leonotis schinzii	x	x

Family	Species	Recorded	POSA
	Mentha aquatica		x
	Ocimum obovatum	x	
	Salvia runcinata		x
	Syncolostemon pretoriae		x
	Teucrium trifidum		x
Lobeliaceae	*Cyphia assimilis*		x
	Lobelia erinus		x
	Lobelia flaccida		x
	Monopsis decipiens		x
Lythraceae	*Nesaea sagittifolia*		x
	Nesaea schinzii		x
Malvaceae	*Dombeya rotundifolia*	x	
	Hermannia coccocarpa		x
	Hermannia cordata		x
	Hermannia depressa	x	x
	Hermannia geniculata		x
	Hermannia grandistipula		x
	Hermannia lancifolia		x
	Hermannia sp.		x
	Hibiscus microcarpus	x	
	Melhania prostrata		x
	Sida chrysantha		x
	Sida rhombifolia		x
Meliaceae	*Melia azedarach*	x	
Menispermaceae	*Antizoma angustifolia*		x
Molluginaceae	*Psammotropha myriantha*		x
Moraceae	*Ficus sp.*	x	
Myrsinaceae	*Myrsine africana*		x
Oleaceae	*Menodora africana*	x	
Onagraceae	*Oenothera tetraptera*		x
Orchidaceae	*Eulophia hians*		x
	Habenaria bicolor		x
	Habenaria epipactidea		x
	Satyrium hallackii		x
Orobanchaceae	*Harveya huttonii*		x
	Harveya speciosa		x
	Striga bilabiata		x
Phytolaccaceae	*Phytolacca dioica*	x	
	Phytolacca octandra		x
Pinaceae	*Pinus sp.*	x	
Plantaginaceae	*Plantago lanceolata*		x
	Veronica anagallis-aquatica		x
Poaceae	*Agrostis eriantha*		x

Family	Species	Recorded	POSA
	Alloteropsis semialata		x
	Andropogon appendiculatus		x
	Andropogon schirensis		x
	Aristida bipartita		x
	Aristida canescens		x
	Aristida diffusa		x
	Aristida sp.		x
	Arundinella nepalensis		x
	Brachiaria serrata		x
	Chloris virgata	x	x
	Cymbopogon caesius		x
	Cynodon transvaalensis		x
	Digitaria diagonalis		x
	Digitaria monodactyla		x
	Digitaria ternata		x
	Digitaria tricholaenoides		x
	Diheteropogon amplectens		x
	Echinochloa jubata		x
	Elionurus muticus		x
	Eragrostis capensis		x
	Eragrostis curvula		x
	Eragrostis nindensis		x
	Eragrostis sclerantha		x
	Eragrostis sp.		x
	Eragrostis stapfii		x
	Eragrostis tef		x
	Eustachys paspaloides		x
	Harpochloa falx		x
	Helictotrichon sp.		x
	Heteropogon contortus		x
	Hyparrhenia dregeana		x
	Hyparrhenia hirta		x
	Imperata cylindrica		x
	Koeleria capensis		x
	Leersia hexandra		x
	Leptochloa fusca		x
	Lolium multiflorum		x
	Lolium perenne		x
	Miscanthus junceus		x
	Panicum coloratum		x
	Panicum maximum		x
	Panicum repens		x
	Panicum schinzii		x

Family	Species	Recorded	POSA
	Panicum sp.	x	
	Paspalum dilatatum		x
	Paspalum distichum		x
	Pennisetum sphacelatum		x
	Phragmites australis		x
	Poa annua		x
	Setaria nigrirostris		x
	Setaria sp.	x	
	Setaria sphacelata		x
	Sporobolus natalensis		x
	Sporobolus pectinatus		x
	Sporobolus sp.		x
	Themeda triandra	x	
	Trachypogon spicatus		x
	Trichoneura grandiglumis		x
	Tristachya leucothrix	x	x
	Urelytrum agropyroides		x
	Urochloa panicoides		x
Polygalaceae	*Muraltia empetroides*		x
	Polygala houtboshiana		x
	Polygala illepida		x
Polygonaceae	*Persicaria decipiens*		x
	Persicaria madagascariensis		x
	Rumex conglomeratus		x
Polypodiaceae	*Pleopeltis macrocarpa*		x
Potamogetonaceae	*Potamogeton pectinatus*		x
Proteaceae	*Leucospermum cuneiforme*		x
	Protea caffra		x
Pteridaceae	*Adiantum raddianum*		x
	Cheilanthes quadripinnata		x
Ranunculaceae	*Ranunculus dregei*		x
	Ranunculus multifidus		x
Rhamnaceae	*Ziziphus zeyheriana*	x	x
Rosaceae	*Cliffortia nitidula*		x
	Erobotrya japonica	x	
	Rubus rigidus		x
Rubiaceae	*Afrocanthium gilfillanii*		x
	Anthospermum hispidulum		x
	Galium capense		x
	Galium spurium-aparine		x
	Kohautia amatymbica	x	
	Pentanisia angustifolia	x	x
	Vangueria infausta		x

Family	Species	Recorded	POSA
Santalaceae	*Osyris lanceolata*	x	x
	Thesium costatum		x
	Thesium deceptum		x
	Thesium exile		x
	Thesium rasum		x
	Thesium sp.		x
	Thesium transvaalense		x
	Thesium utile		x
	Thesium zeyheri		x
Sapindaceae	*Pappea capensis*		x
Sapotaceae	*Mimusops zeyheri*		x
Scrophulariaceae	*Buddleja saligna*		x
	Diclis rotundifolia		x
	Jamesbrittenia burkeana		x
	Selago capitellata		x
Solanaceae	*Datura stramonium*		x
	Physalis angulata		x
	Solanum campylacanthum		x
	Solanum humile		x
	Solanum mauritianum	x	
	Solanum retroflexum		x
	Solanum sisymbriifolium	x	x
	Solanum sp.	x	
	Withania somnifera		x
Thymelaeaceae	*Gnidia caffra*	x	
	Lasiosiphon caffer		x
	Lasiosiphon capitatus		x
	Lasiosiphon kraussianus		x
	Passerina falcifolia		x
Verbenaceae	*Lippia wilmsii*		x
	Verbena aristigera	x	
	Verbena boniariensis	x	
Vitaceae	*Rhoicissus tridentata*	x	x