Botanical Constraints Analysis for the proposed memorial park at Louw's Bos South (Louw's Bos RE/502), Stellenbosch Municipality

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Prepared for CK Rumboll & Partners

October 2018

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, as amended.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by CK Rumboll & Partners to provide specialist botanical consulting services to determine the botanical constraints that would govern the proposed development of a memorial park at Louw's Bos RE/502, Stellenbosch Municipality.

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Expertise

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- Botanical ecologist with over 37 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 400 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Curriculum Vitae – Appendix 3

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the study 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, commercial 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 refer 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.

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, as amended, 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 13 of GN No. R. 326) 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 13 of GN No. R. 326.

Note: The terms of reference must be attached.

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

24 October 2018

Date:

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1. Introduction

Bergwind Botanical Surveys and Tours CC was appointed by CK Rumboll & Partners on behalf of the Stellenbosch Municipality (the 'Client'), to conduct a botanical constraints analysis of Louw's Bos RE/502 (Louw's Bos South) off Annandale Road, Stellenbosch Municipality. Stellenbosch Municipality proposes to develop Louw's Bos South for a memorial park and has commissioned baseline studies to determine the environmental constraints. In this case, it is any botanical constraints that would apply. The study is conducted in terms of the National Environmental Management Act (NEMA) (No.7 of 1998) as amended and the 2014 Environmental Regulations, as amended. The purpose of the botanical constraints analysis is to inform the environmental assessment process on (a) the sensitivity of the site from a botanical viewpoint and (b) to determine any constraints that should be implemented to conserve the vegetation and flora, if necessary, should the development be authorized.

The principles, guidelines and recommendations of CapeNature and the Botanical Society of South Africa for proactive assessment of the biodiversity of proposed development sites have been followed (Brownlie 2005, Cadman *et al.* 2016).

2. Terms of Reference

Undertake a site visit to the study area and compile a specialist report that addresses the following:

- Take cognizance of, and comply with, the substantive content requirements outlined within Appendix 6 of GN R982, as amended, which outlines the legal minimum content requirements for specialist studies in terms of the 2014 NEMA EIA Regulations;
- The local and regional context of the vegetation communities and plant species within the affected areas, taking cognizance of the relevant biodiversity plans, bioregional planning documents, Environmental Management Frameworks etc.
- The ecosystem status and conservation value of the vegetation communities, including the whether the potentially affected areas comprise critically endangered or endangered ecosystem(s) listed in terms of section 52 of the NEMBA;
- Any rare or endangered species encountered or likely to be or have been present;
- Take cognizance of the Department of Environmental Affairs (DEA) and Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving

Biodiversity Specialists in the EIA Process and the requirements of the Botanical Society of South Africa (BotSoc) in developing an approach to the botanical investigation.

3. Study Area

3.1 Locality, Definition and Character

Louw's Bos South is located approximately 2.5 km east of Lynedoch (Baden Powell Drive) along Annandale Road, Stellenbosch Municipality, and lies south of Annandale Road, (Figure 1). It is within the Stellenbosch 'Wine of Origin' District.

The study area is not the whole of Farm RE/502 but only part thereof as shown in Figure 2, the smaller red polygon with the internal shaded red polygon. This is referred to further as the 'focus area' to distinguish it from the larger farm portion, and it is the area of concern in this investigation.

Part of the study area is currently planted with vines whereas the remaining area is fallow but has been cultivated in the past. Natural indigenous vegetation is no longer present as is described in more detail below.

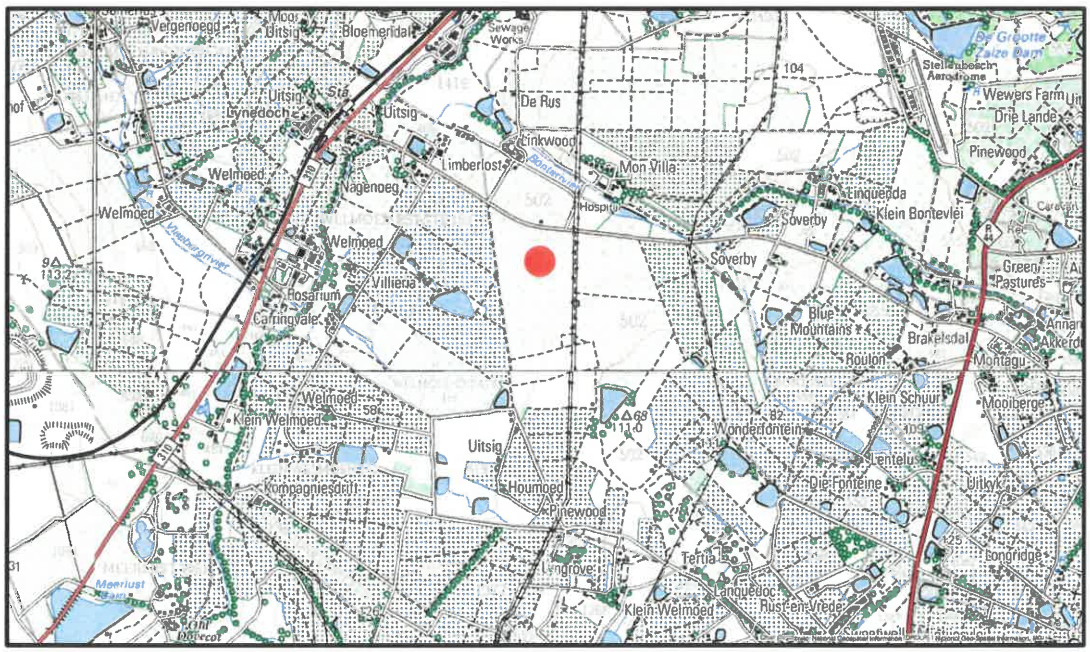


Figure 1. The location of Louw's Bos South near Lynedoch in the Stellenbosch Municipality.

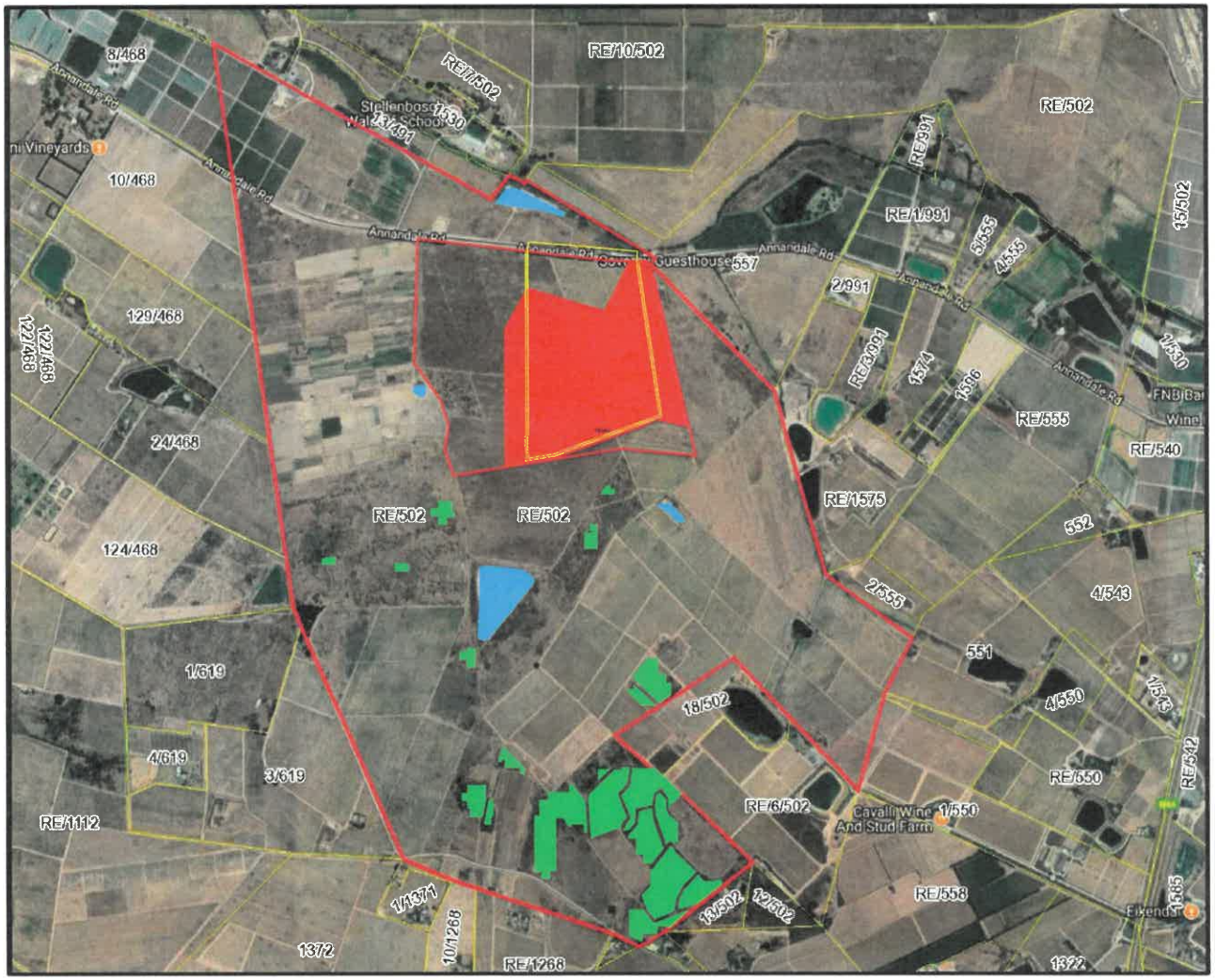


Figure 2. Annotated aerial image (Google Earth ™) showing Farm RE/502 'Louw's Bos South' (red boundary) with the internal focus area (smaller red boundary) and area or specific interest for the cemetery (red shaded area). Site Development Plan Diagram supplied by C.K. Rumboll & Partners.

3.2 Physiography

3.2.1 Topography, Geology and Soils

Topography: The study area has a general north to north-west aspect (Figure 3) with a moderate slope from south to north.

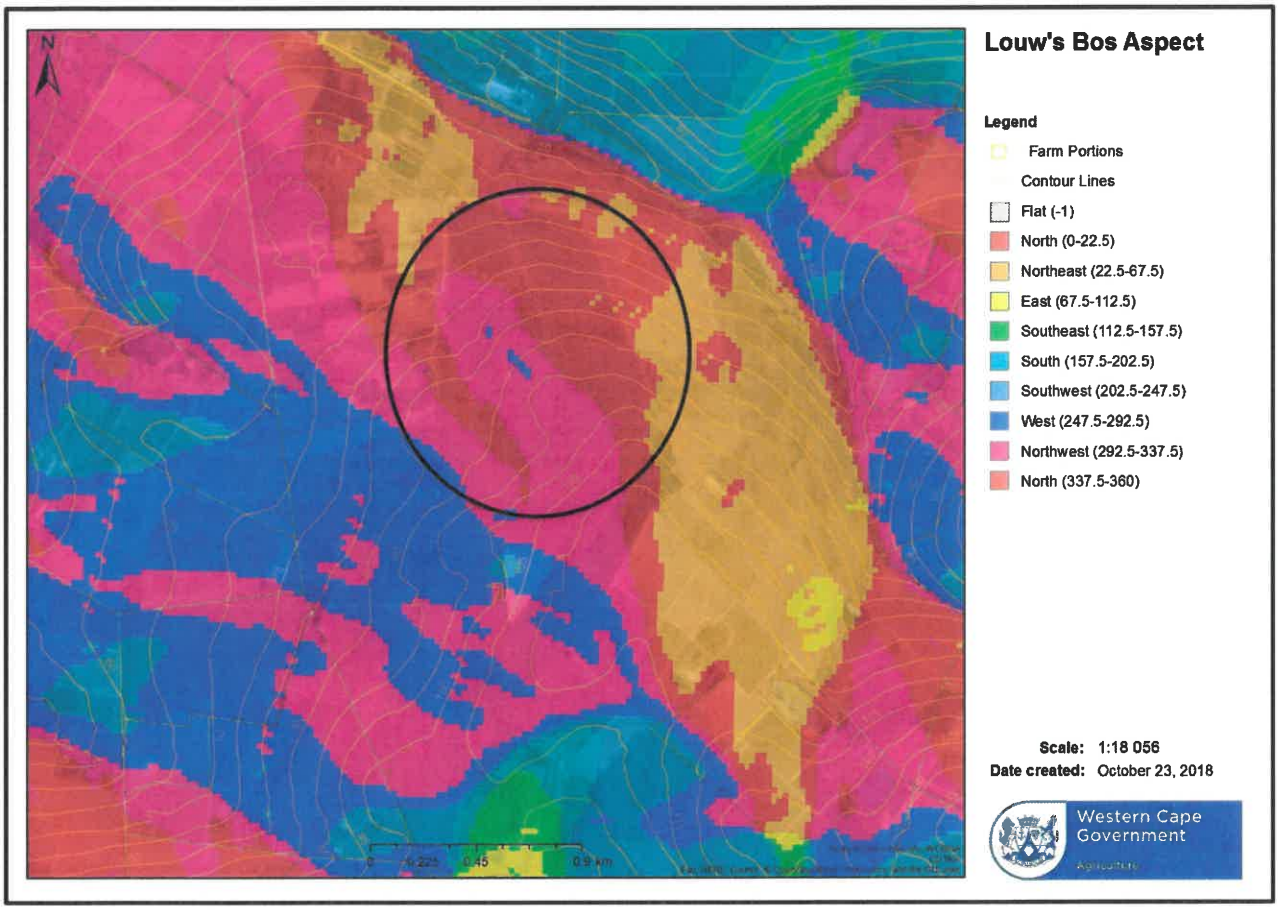


Figure 3. Aspect of the study area at Louw's Bos South – mostly northerly.

Geology: The underlying geology is granite of the Kuilsrivier Batholith, Cape Granite Suite (Figure 4). Granite is the main rock-type, however, silcrete crops out in the general area but it does not occur in the 'focus area'.

Soils:

The granite bedrock has weathered to form friable acidic soils that are clay-rich and have a good water retention capability. These soils also contain kaolin as a weathering product of granite.

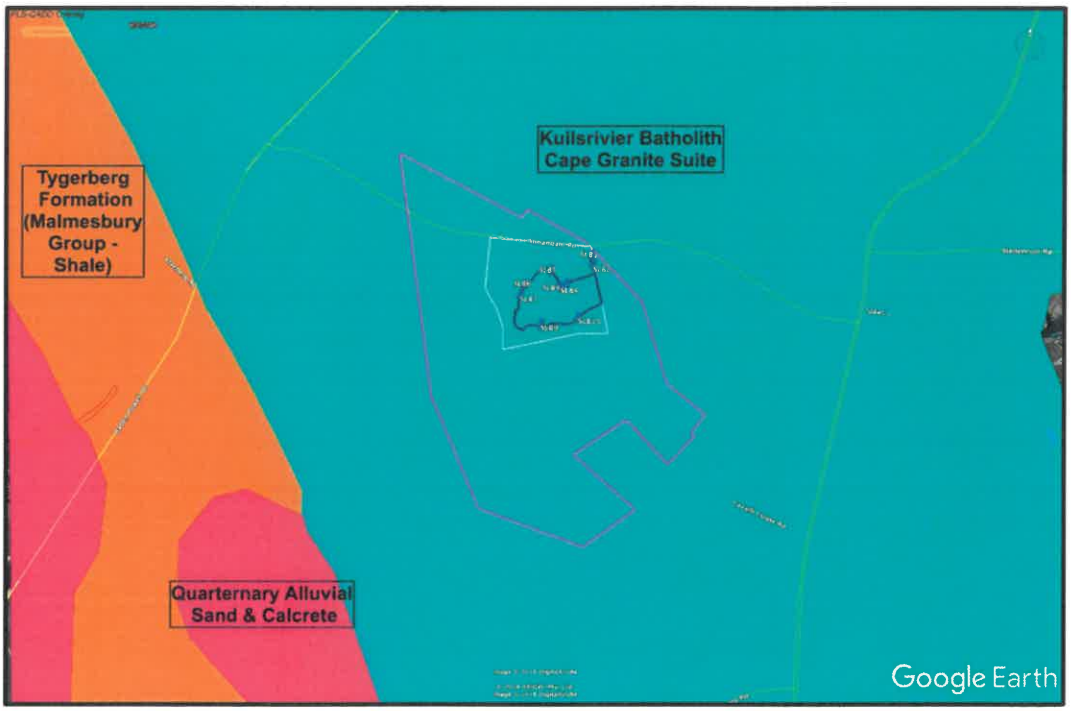
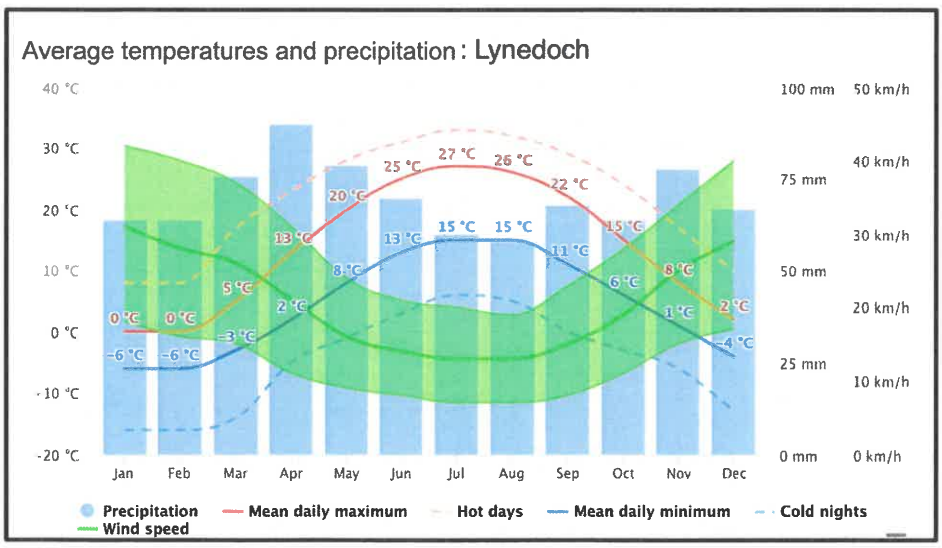


Figure 4. Geological map showing that the entire study area is underlain by the Kuilsrivier Batholith (Cape Granite Suite).

3.2.2 Climate

Louw's Bos South has a well-defined Mediterranean-type climate with cool wet winters and hot, dry, windy summers. In winter the wind prevails from the north-west and brings rain whereas in summer the wind prevails from the south-east. Precipitation peaks in June, July and August and is lowest from December to March. The hottest average daily maximum is in January and February and the lowest daily minimum in July and August as seen in Figure 5, a climate diagram for Lynedoch.



Figure

Figure 5. Average temperatures (°C), average monthly rainfall (mm) and wind-speed for Lynedoch (Source: Meteoblue)..

4. Methods

4.1 Field Sampling

The field-work for the assessment of the site was carried out on 8 August 2018 for 5 hours. The method used was a 'rapid-assessment technique' in which site observations and numerous photographs were taken at randomly distributed waypoints (Figure 6). This provided adequate information to characterize the vegetation of the site.

The site was accessed from Annandale Road at the Lynedoch Eskom Substation and surveyed on foot. The route was southwards along a farm road and then westwards between existing vineyards to the fallow fields west of the vineyards.

The route was recorded on a handheld Garmin GPSmap 62s (Figure 4) was later transferred to Google Earth ™ (Figure 6).

Apart from a general appraisal of the habitat and vegetation, as is standard practice, particular attention was given to the possibility of finding plant species of conservation concern.

4.2 Desk-top analysis and reporting

The recorded information together with satellite aerial-photographs and the photographs obtained in the field, were used for description of the vegetation presented in this report. The National Vegetation Map (SANBI, 2012) (referred to as VEGMAP) was used as the 'base-map' to determine the principal original vegetation type.

The Western Cape Biodiversity Spatial Plan 2017 (WCBSP, 2017; Pool-Stanvliet *et al.* 2017) published by CapeNature was consulted to ascertain the conservation status of the study area.

5. Limitations and Assumptions

Spring is the ideal time for vegetation surveys in the south-western Cape where winter-rainfall predominates. Early August 2018 was thus suitable for the study and no seasonal limitation prevailed.

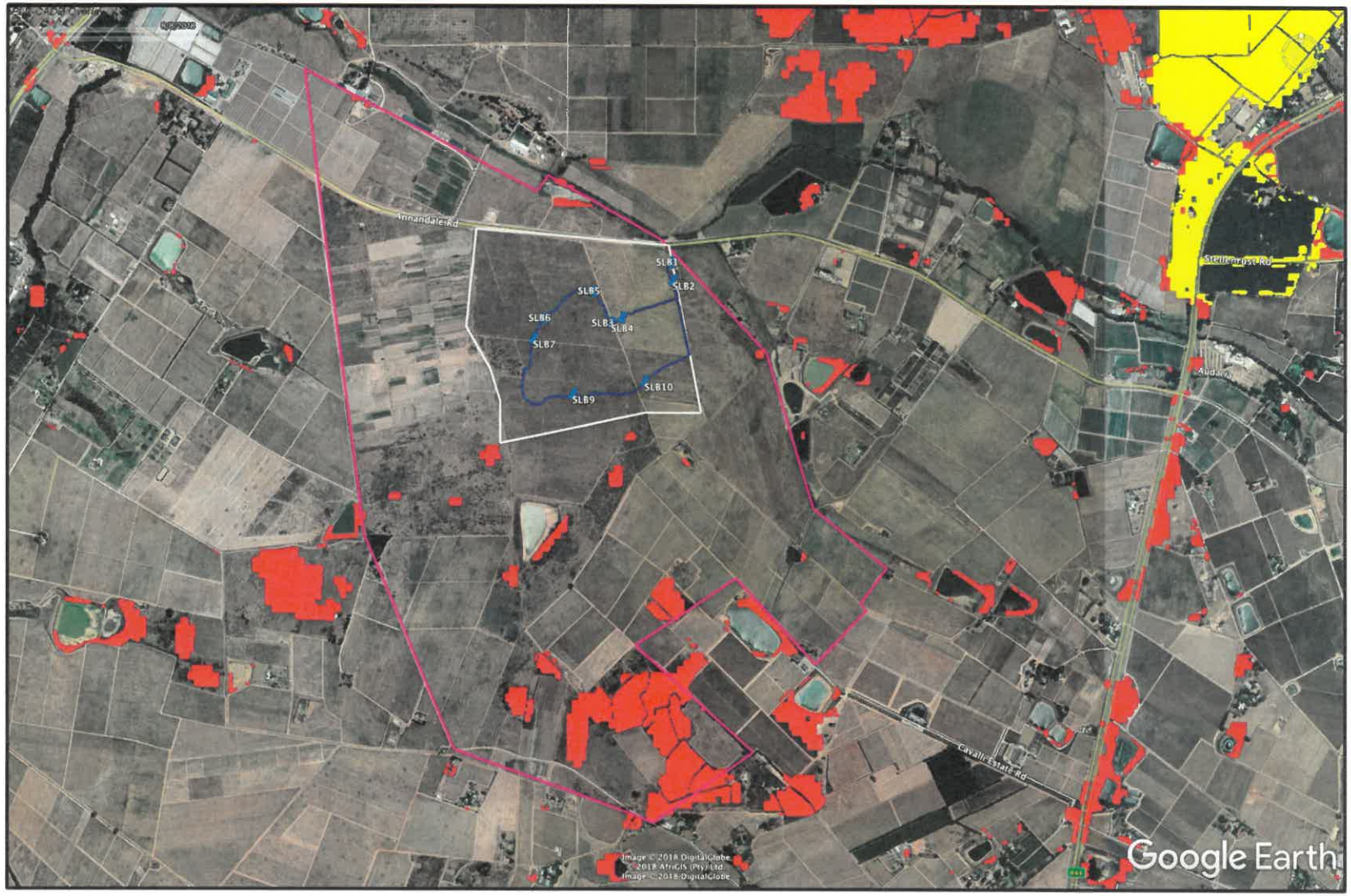


Figure 6. Aerial image (Google Earth ™) of the focus area (white outline) with survey track (dark blue) and waypoints SLB#. The red shading represents Critical Biodiversity Area 1 and the yellow shading Critical Biodiversity Area 1 as per the WCBSP. No critical biodiversity areas are mapped in the focus area.

6. Disturbance regime

The study area is entirely rural and is not influenced at all by urban development or activities. The principal disturbance is the effect of current and historical agriculture, including farm tracks. The major disturbance has thus been the removal of natural vegetation and ploughing to establish vineyards.

7. The Vegetation

7.1 The vegetation in context

According to Rebelo *et al.* (2006, in Mucina & Rutherford, 2006) the original vegetation found in the study area was Swartland Granite Renosterveld (Figure 7). This vegetation type is a species-rich shrubland dominated by renosterbos (*Elytropappus rhinocerotis*), with a mix of grasses and herbs in the understorey. Thickets are associated with rock outcrops and heuweltjies.

This critically endangered vegetation type (see below) has now been completely removed in the 'focus area'. There is no remnant left.

7.2 The current land-cover of the 'focus area'.

Currently the land-cover of the focus area is vineyards that are actively cultivated, areas of fallow land that may have been under vineyards in the past and one field of a cereal crop. The focus area has thus been completely transformed and there is no intact indigenous plant community anywhere within it, albeit that there are indigenous plants present that are weedy and become dominant in fallow conditions.

The vegetation (and other biodiversity) was sampled at 10 waypoints and the habitat condition at each of the waypoints is described in Table 1.

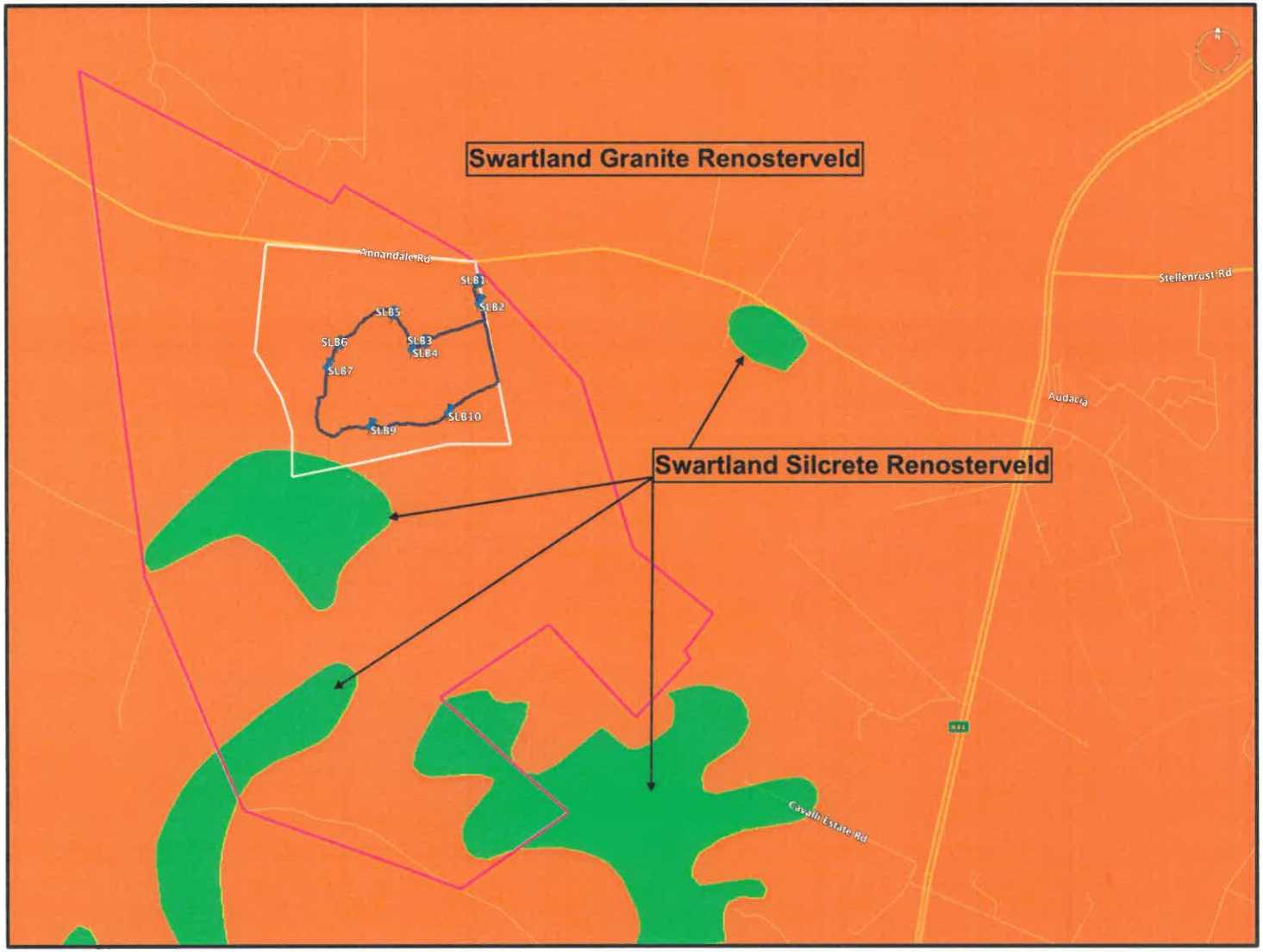
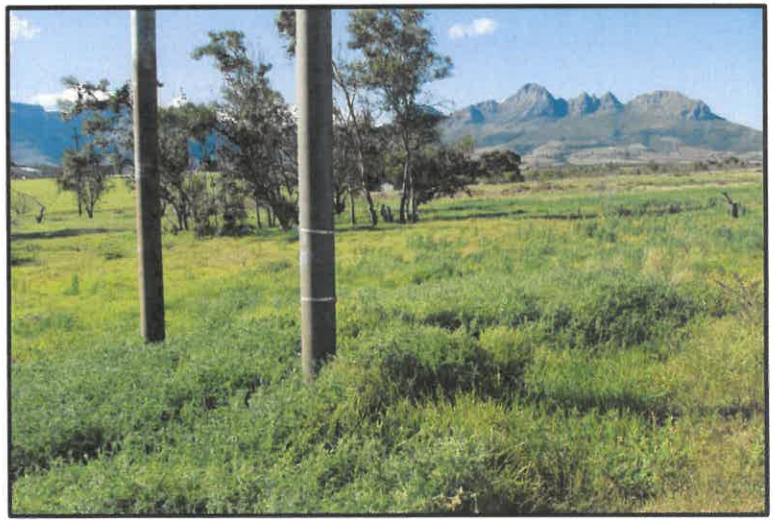


Figure 7. Portion of the *Vegetation map of South Africa, Lesotho, and Swaziland* (Mucina, Rutherford & Powrie 2005) indicating that in this classification the study area (outlined in white) would all have been Swartland Granite Renosterveld.

Table 1. Recorded waypoints with observations at each waypoint. Plant species marked * are exotic plants.

Waypoint	Co-ordinates	Notes	Illustration
SLB1	S 33° 59' 29.8" E 18°48' 04.7"	At Lynedoch Substation. Vegetation totally transformed with kikuyu grass, lupins, *Paraserianthes lophantha* (stinkbean) and *Acacia saligna* (Port Jackson Willow). A patch of *Pennisetum macrourum* (riverbed grass) was found next to the substation. This indicates wetness. Vineyards are found west of the substation.	 

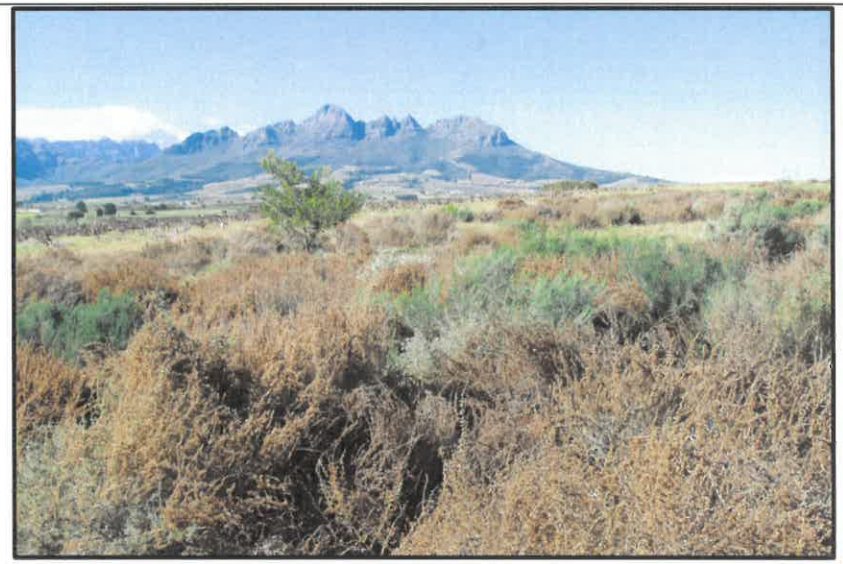
SLB2	S 33° 59' 32.5" E 18°48' 05.0"	Area immediately behind (south of) the substation. It is completely transformed. Now vegetated with exotic annual grasses and *Vicia purpurea* (purple vetch). A stand of *Acacia saligna* is found here too. Other species recorded include, *Bromus diandrus*, Capsella bursa-pastoris*, Cotula* sp., *Echium plantagineum*, Erodium moschatum*, Lupinus angustifolius*, Oxalis pes-caprae, Pennisetum clandestinum*, Plantago lanceolata*, Raphanus raphanistrum*.*	

SLB3	S 33° 59' 39.9" E 18°47' 56.1"	At granite outcrop where there is an isolated stand of *Searsia angustifolia.* This is the only indigenous species present here.	

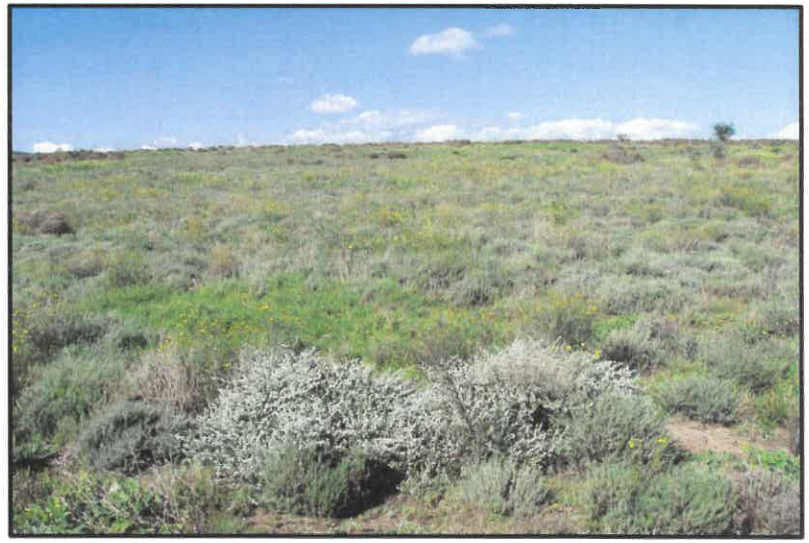
			
SLB4	S 33° 59' 38.7" E 18°47' 54.2"	At boundary fence between vineyard and fallow land to the west. There is a high level of disturbance east of the fence.	

			
SLB5	S 33° 59' 34.1" E 18°47' 51.0"	This area in the west has been historically cultivated and is now fallow. It has probably not been cultivated for more than 10 years. The vegetation cover has come back but clearly shows signs of past disturbance. Apart from exotic grasses and weedy forbs, the dominant species is *Stoebe plumosa* (slangbos) – a good indicator of massive disturbance.	

		Other species recorded at this waypoint include *Acacia saligna*, Bromus diandrus**, Conyza bonariensis*, *Cotula* sp. – white, *Cynodon dactylon* (dominant grass), *Dimorphotheca pluvialis*, *Elytropappus rhinocerotis* (renosterbos), *Helichrysum auriculatum, Helichrysum* sp. (2) *Helichrysum* sp. (3), *Leysera gnaphalodes, Otholobium hirtum, Oxalis pes-caprae, Pennisetum clandestinum*, Plantago lanceolata*, Raphanus raphanistrum*, Senecio burchellii, Senecio rigidus, Taraxacum* sp.*, *Vicia purpurea**.	

SLB6	S 33° 59' 38.1" E 18°47' 42.3"	In fallow area where there is not much *Stoebe plumosa*. This area is	

		dominated by grasses and weedy forbs. A few indigenous species present. Species recorded include, *Arctotheca calendula, Avena fatua*, Bromus* sp. *, *Echium plantagineum*, Erodium moschatum, Hermannia* sp. (yellow flowers), *Leysera gnaphalodes* (common), *Melinis* sp., *Otholobium hirtum, Pennisetum clandestinum*, Raphanus raphanistrum*, Senecio burchellii, Senecio rigidus, Stoebe plumosa, Taraxacum* sp.	 

SLB7	S 33° 59' 41.1" E 18°47' 40.5"	At track through western part of the focus area. This entire are is fallow and has abundant cover of Stoebe plumosa. It has VERY LOW botanical sensitivity.	
SLB8	S 33° 59' 48.1" E 18°47' 38.5"	Fallow lands in the southwestern sector of the focus area, with abundant *Stoebe plumosa*. The same fallow land plant community extends over an extensive area. *Cynodon dactylon* is the dominant grass and *Stoebe plumosa* occurs in varying density as the dominant shrub.	

SLB9	S 33° 59' 49.2" E 18°47' 47.4"	The area around this waypoint is fallow but 'restored' with *Elytropappus rhinocerotis* (renosterbos) and *Stoebe plumosa* (slangbos), the dominant mid-high shrubs. The low stratum is dominated by *Helichrysum* sp.	
SLB10	S 33° 59' 47.3" E 18°48' 00.0"	Recently ploughed land planted with cereal crop.	

8. Other biodiversity considerations

While conducting the vegetation / habitat survey, attention was paid to other elements of the biodiversity of the 'focus area'. This had severe limitations since to evaluate the avifauna, small mammal fauna and invertebrate fauna, an extensive study would be required that was beyond the scope of this survey. However, it was apparent that the general level of biodiversity was low. There was not a great deal of bird activity, observations of insects were few and evidence of small mammals was scant. The single bird species that was active was the Karoo Prinia (*Prinia maculosa*) (Figure 8). In addition, the exotic butterfly, Cabbage White (*Pieris brassicae*) (Figure 9) was noted feeding on the flowers of the exotic weed *Raphanus raphanistrum*. A second butterfly species that was recorded is the common Meadow White (*Pontia helice helice*) (Figure 10) but further than these none were recorded.

Figure 8. Karoo Prinia, a common species in the Western Cape Province.

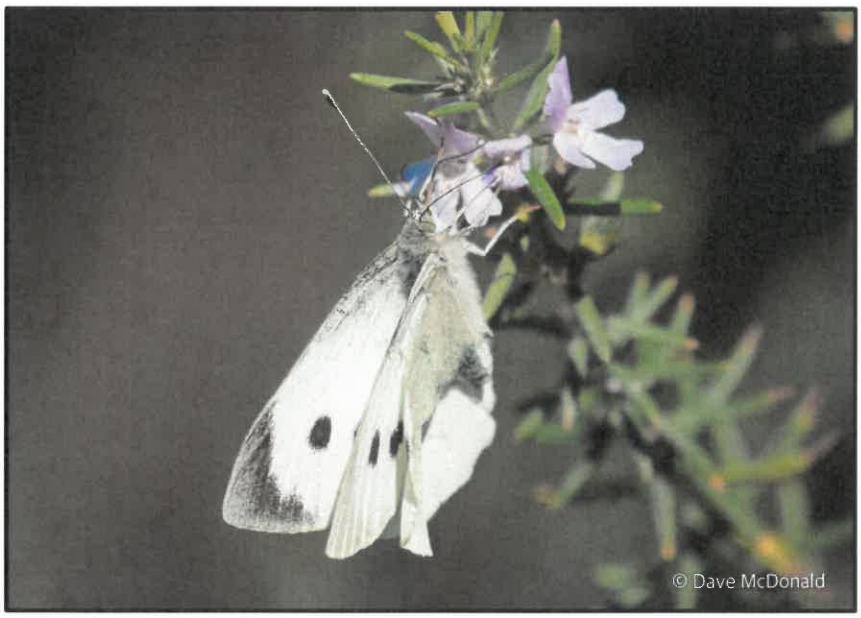


Figure 9. Cabbage White butterfly – an exotic species.

Figure 10. Meadow White butterfly – a widespread species throughout South Africa.

9. Conservation status

Swartland Granite Renosterveld is listed as Critically Endangered A1 & D1 in the National List of Threatened Ecosystems (Government Gazette, 2011). However, none of this vegetation type was found at Louw's Bos South. The vegetation present has a very low sensitivity and has not been assigned to any critical biodiversity area or ecological support area category (see Figure 6). The entire focus area has been irreversibly degraded and no longer supports any habitat that could be restored to the original or near-original condition.

No plant species of conservation concern were recorded and there is a significant paucity of geophytes in the focus area. This is ascribed to the long history of agriculture.

10. Constraints Analysis

From a botanical and general biodiversity perspective the constraints on development of the Stellenbosch Cemetery at Louw's Bos South are very low. Since the habitat is highly transformed there are no botanical or other habitat indicators that would preclude development.

11. Development layouts

No development layouts were assessed in this study; only a site development plan as shown in Figure 2.

12. Preliminary Impact Assessment

Potential impacts on the vegetation are preliminarily assessed for the proposed development of the memorial park / cemetery.

12.1 Direct Impacts

Direct impacts are those that would occur directly on the vegetation of the site as a result of the proposed development. The rating system used is given in Appendix 1. In addition to determining the individual impacts using various criteria, mitigation is also brought into the assessment.

The impacts of the development on the vegetation and habitat are considered with respect to:

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

12.1.1 Loss of vegetation type and habitat due to construction and operational activities

In the case of the **"No Go" option** where there would be no development at Louw's Bos South. The *status quo* would persist and the site would continue to exist in much the same way as at present unless agriculture is pursued. The 'no development' alternative or 'No Go' alternative could thus have **ZERO** impact since no Swartland Granite Renosterveld persists (Table 2).

Table 2. Impact and Significance – Loss of Swartland Granite Renosterveld in the construction and operational phases

CRITERIA	'NO GO' ALTERNATIVE		SITE DEVELOPMENT PLAN	
Nature of direct impact (local scale)	**Loss of Swartland Granite Renosterveld**			
	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term
Intensity	Low	Low	Medium	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Confidence	High	High	High	High
Significance	None	None	None	None
Nature of Cumulative impact	**Loss of Swartland Granite Renosterveld**			
Cumulative impact prior to mitigation	No impact			
Degree to which impact can be reversed	Not reversible			
Degree to which impact may cause irreplaceable loss of resources	Zero			
Degree to which impact can be mitigated	Zero			
Proposed mitigation	None proposed			
Cumulative impact post mitigation	Zero			
Significance of cumulative impact (broad scale) after mitigation	Zero			

12.1.2 Mitigation

No mitigation is proposed since the site is so degraded and there is no natural vegetation or plant community that is worth restoring.

12.2.1 Loss of ecological processes

At present ecological processes in the shrubland in the focus area are poorly functional. The existing habitat provides shelter for birds, small mammals and invertebrates but it has very low diversity and ecological processes have largely been compromised. No ecological processes would be lost by the proposed memorial park / cemetery development but such processes could be enhanced by improvement of the habitat by suitable landscaping. This would result in a **MEDIUM POSITIVE** impact (Table 3).

Table 3. Impact and Significance – Loss of ecological processes during construction and operational phases

CRITERIA	'NO GO' ALTERNATIVE		SITE DEVELOPMENT PLAN	
Nature of direct impact (local scale)	**Loss of ecological processes**			
	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term
Intensity	Low	Low	High	High
Probability of occurrence	Probable	Probable	Probable	Probable
Confidence	High	High	High	High
Significance	Low negative	Low negative	Low negative	Medium positive
Nature of Cumulative impact	**Loss of ecological processes**			
Cumulative impact prior to mitigation	Low Negative			
Degree to which impact can be reversed	Ecological processes could be enhanced by appropriate landscaping			
Degree to which impact may cause irreplaceable loss of resources	Low			
Degree to which impact can be mitigated	medium			
Proposed mitigation	Suitable landscaping to promote ecological processes			
Cumulative impact post mitigation	Medium positive			
Significance of cumulative impact (broad scale) after mitigation	Medium positive			

12.2.2 Mitigation

Mitigation for loss of ecological processes would be possible by improving the habitat. This would be possible and compatible with the use of the 'focus area' as a memorial park / cemetery.

12.3 Indirect impacts

By definition indirect impacts occur away from the 'action source' i.e. away from the development site. The impact assessed here is specifically how the proposed development would have an indirect impact on vegetation and flora away from the development site. Indirect impacts would be insignificant.

12.4 Cumulative impacts

Cumulative impacts on the Critically Endangered Swartland Shale Renosterveld as a vegetation / habitat type would be **nil**, since the area investigated is in such a degraded state and no longer supports this vegetation type.

13. General Assessment and Recommendations

- No vegetation or habitat of any significant value was found in the area surveyed. It consists either of vineyards, cultivated land with cereals and fallow lands with a long history of removal of the natural (indigenous) vegetation.
- No protected trees or plant species of conservation concern were recorded.
- The proposed site development plan was examined and from a botanical and general biodiversity perspective and there is no doubt that the entire site is transformed. It would be unrealistic to attempt to restore the site to near-original condition.
- The botanical / biodiversity sensitivity very low to negligible despite some areas having 'restored' due to being left fallow. The general suite of plant species consists of weedy exotics and a handful of disturbance-tolerant indigenous species. There would thus be **NO NEGATIVE** impact on Swartland Granite Renosterveld and a **LOW NEGATIVE** impact on the on ecological processes. The latter could be restored to a certain extent by appropriate landscaping.

14. Conclusions

The site chosen for the proposed Stellenbosch Memorial Park / Cemetery at Louw's Bos South is eminently suitable for the desired purpose. Effect on natural vegetation and habitat would be very low and the use of this area would not lead to any further loss of critically endangered Swartland Granite Renosterveld. The project is thus supported unreservedly from a botanical / biodiversity perspective.

15. 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.

Cadman, M. 2016. (ed.) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape, Edition 2. Fynbos Forum, Cape Town, 201pp.

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

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

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

Pool-Stanvliet, R., Duffell-Canham, A., Pence, G., Smart, R. 2017. Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch: CapeNature.

Rebelo, A.G., Boucher, C., Helme, N., Mucina, L. & Rutherford, M.C. 2006. Fynbos Biome. In: Mucina, L. & Rutherford, M.C. (eds.) The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia 19.* South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI) 2012, Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2012. Available from the Biodiversity GIS website http://bgis.sanbi.org/SpatialDataset/Detail/18.

Report submitted: 24 October 2018

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 (ie. 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: Botanical Assessment Content Requirements of Specialist Reports, as prescribed by Appendix 6 of GN R326.

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (a)	Details of- (i) The specialist who prepared the report; and	Cover & Page 2
	(ii) The expertise of that specialist to compile a specialist report, including a CV.	Page 2; Appendix 3
1 (1) (b)	A declaration that the specialist is independent in a form as may be specified by the competent authority.	Page 4
1 (1) (c)	An indication of the scope of, and purpose for which, the report is prepared.	Page 6
1 (1)(cA)	An indication of the quality and age of base data used for the specialist report.	Page 11
1 (1)(cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Page7; Pages 15--23
1 (1) (d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Page 11
1 (1) (e)	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used.	Page 11
1 (1) (f)	Details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	Pages 26--28
1 (1) (g)	An identification of any areas to be avoided, including buffers.	Not applicable
1 (1) (h)	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Page 8
1 (1) (i)	A description of any assumptions made and any uncertainties or gaps in knowledge.	Page 11
1 (1) (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	Pages 15--25
1 (1) (k)	Any mitigation measures for inclusion in the EMPr.	None
1 (1) (l)	Any conditions for inclusion in the environmental authorisation.	None
1 (1) (m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	None

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (n)	A reasoned opinion- (i) whether the proposed activity, activities or portions thereof should be authorised; and	Page 29
	(iA) regarding the acceptability of the proposed activity or activities; and	Page 29
	(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Not applicable
1 (1) (o)	A description of any consultation process that was undertaken during the course of preparing the specialist report	Not applicable
1 (1) (p)	A summary and copies of any comments received during any consultation process and where applicable, all responses thereto	Not applicable
1 (1) (q)	Any other information requested by the competent authority	Not applicable

Appendix 3: 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:** 082-876-4051 **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
- Twelve 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:

- 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