Botanical Impact Assessment for the proposed Project 3 Solar PV Farm at Visserspan 40 near Dealesville, Free State Province

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National Legislation and Regulations governing this report

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

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC to provide specialist botanical consulting services for the assessment of the area for the proposed development of a solar farm on the farm Visserspan 40, near Dealesville, Free State Province.

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Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 40 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, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

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

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

Declaration of independence:

I David Jury McDonald, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

14 February 2020

Date:

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1. Background and Brief

Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC on behalf of Keren Energy (the 'Applicant') to undertake a botanical impact assessment to determine the impact of the Visserspan Project 3 Solar PV Farm at the farm Visserspan 40, near Dealesville, Free State Province.

2. Terms of Reference

- Take cognizance of, and comply with, the substantive content requirements outlined within Appendix 6 of GN R982, as amended (i.e. GN 326), which outlines the legal minimum requirements for specialist studies in terms of the 2014 NEMA EIA Regulations, as amended;
- Described the local and regional context of the vegetation communities and plant species found within the area of the Visserspan Project 3 Solar PV Farm.
- Determine 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;
- Record any rare or endangered species encountered or likely to be or have been present;
- The presence of and proximity of the proposed site to protected area(s) identified in terms of NEMPAA and proximity to a Biosphere Reserve (where relevant) (within, at least, a 20km radius of the site).
- Describe the direct, indirect and cumulative botanical impacts (both before and after mitigation) and an assessment of the significance of the impacts (for the proposed project and "No Go" alternative) (on a nominal scale of Neutral, Negligible, Low, Medium, High) by evaluating (a) status of the impact (positive/ negative), (b) extent of the impact (Low /Medium/ High), (c) magnitude of the impact (Low/ Medium/ High), (d) duration of the impact (Low/ Medium/ High) and (e) probability of occurrence of the impacts (Low/ Medium/ High) In addition, (f) the level of confidence in findings relating to potential impacts, (g) reversibility of potential impacts (i.e. the degree to which the impact can be reversed, low/medium/high); and (h) the degree to which the impact may cause irreplaceable loss of resources (Low/ Medium/ High).

3. Project Area

3.1 Locality and Extent

Farm Visserspan 40, is approximately 10 km north the small town of Dealesville, which in turn is 68 km west of Bloemfontein in the Free Sate Province. The entire farm is 1190 ha in extent (Figures 1--3). Importantly, this farm is near the Eskom Perseus Substation, one of the largest power substations in South Africa, and a suitable connection point for any solar PV plant that may be built in the area.

The Visserspan Project 3 Solar PV Farm lies in the northern part of Visserspan 40 as shown in Figure 9 and is 222 ha in extent.

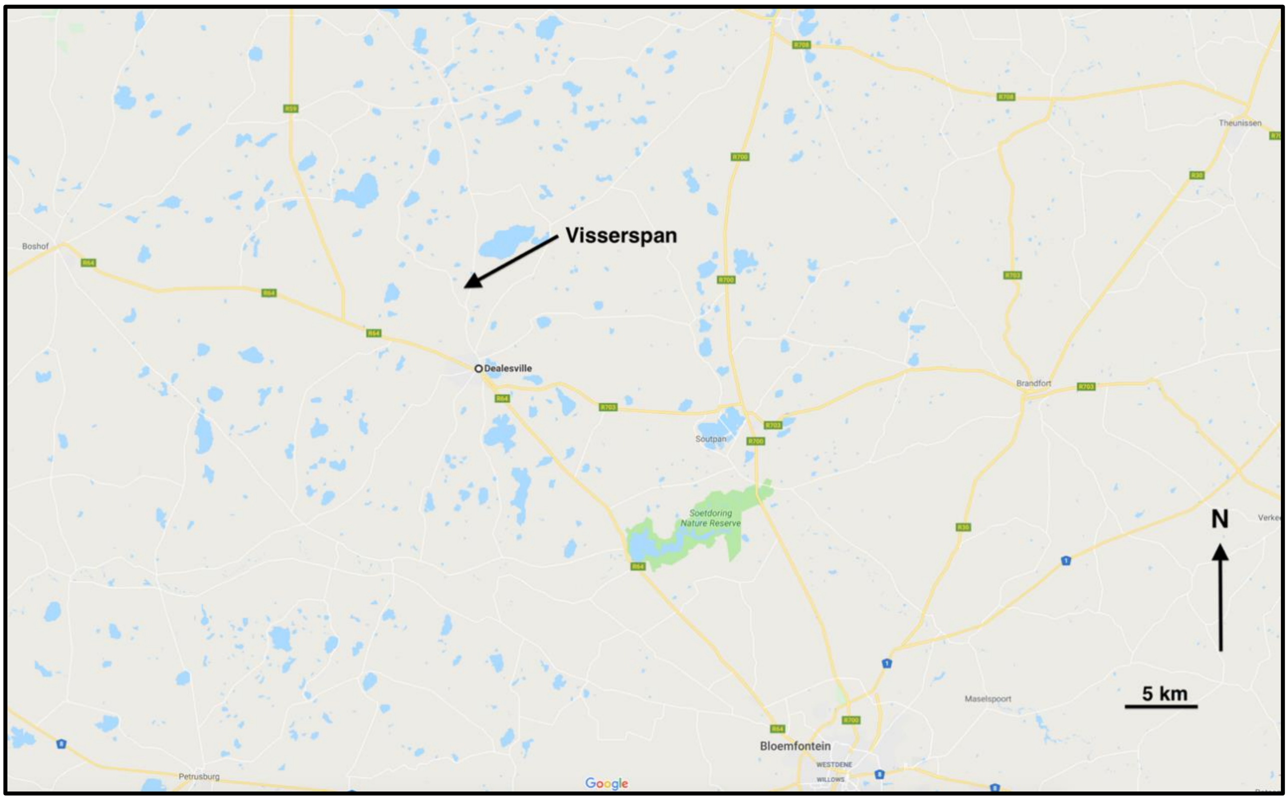

Figure 1. General location of Visserspan north of Dealesville in the Free State Province.

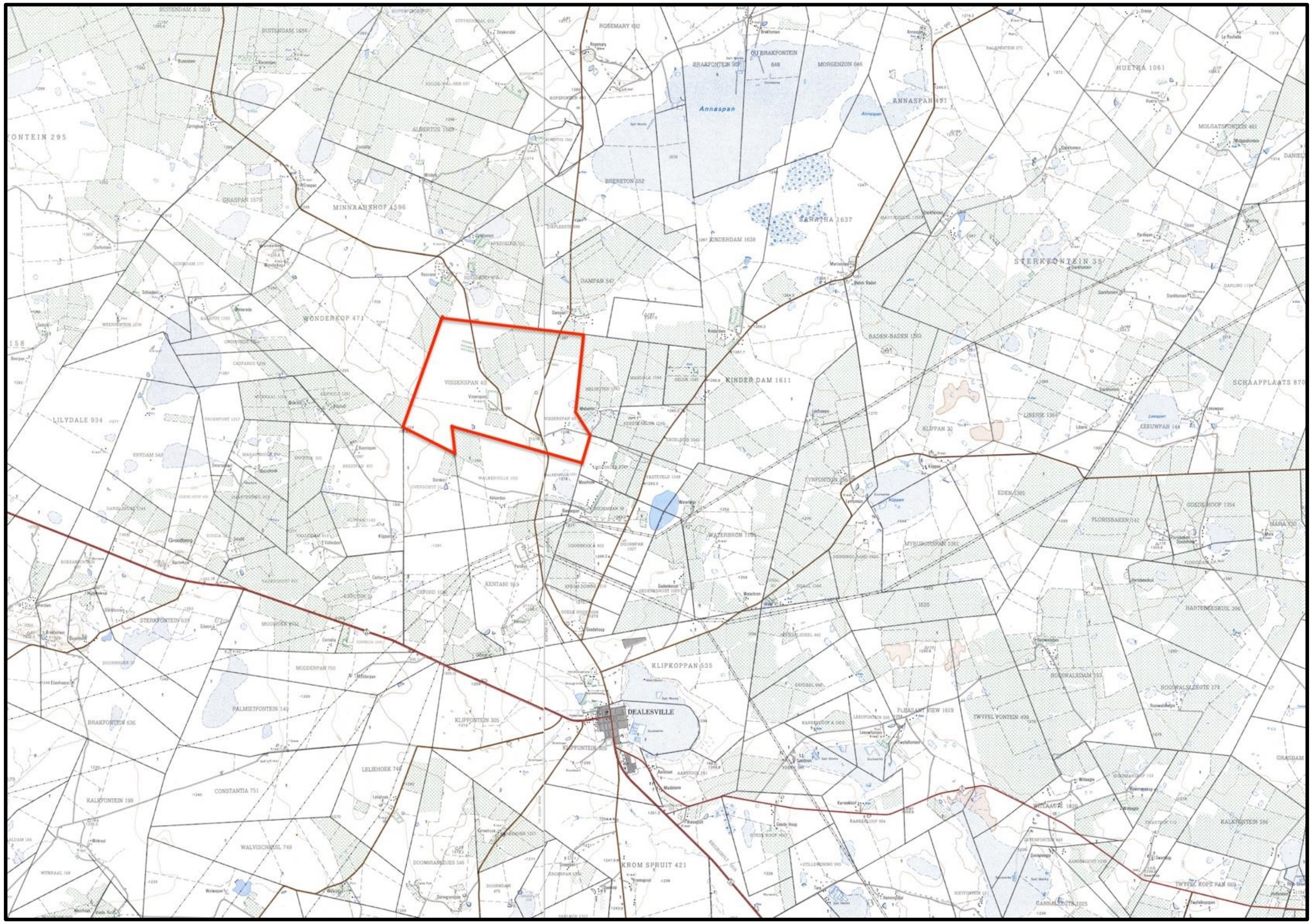

Figure 2. Topographic map showing the location and extent of Visserspan 40. The topography is relatively flat (Map source: 1: 50 000 2825 DA Elandsfontein and 2825 DB Dealesville, Chief Directorate: National Geo-spatial Information).

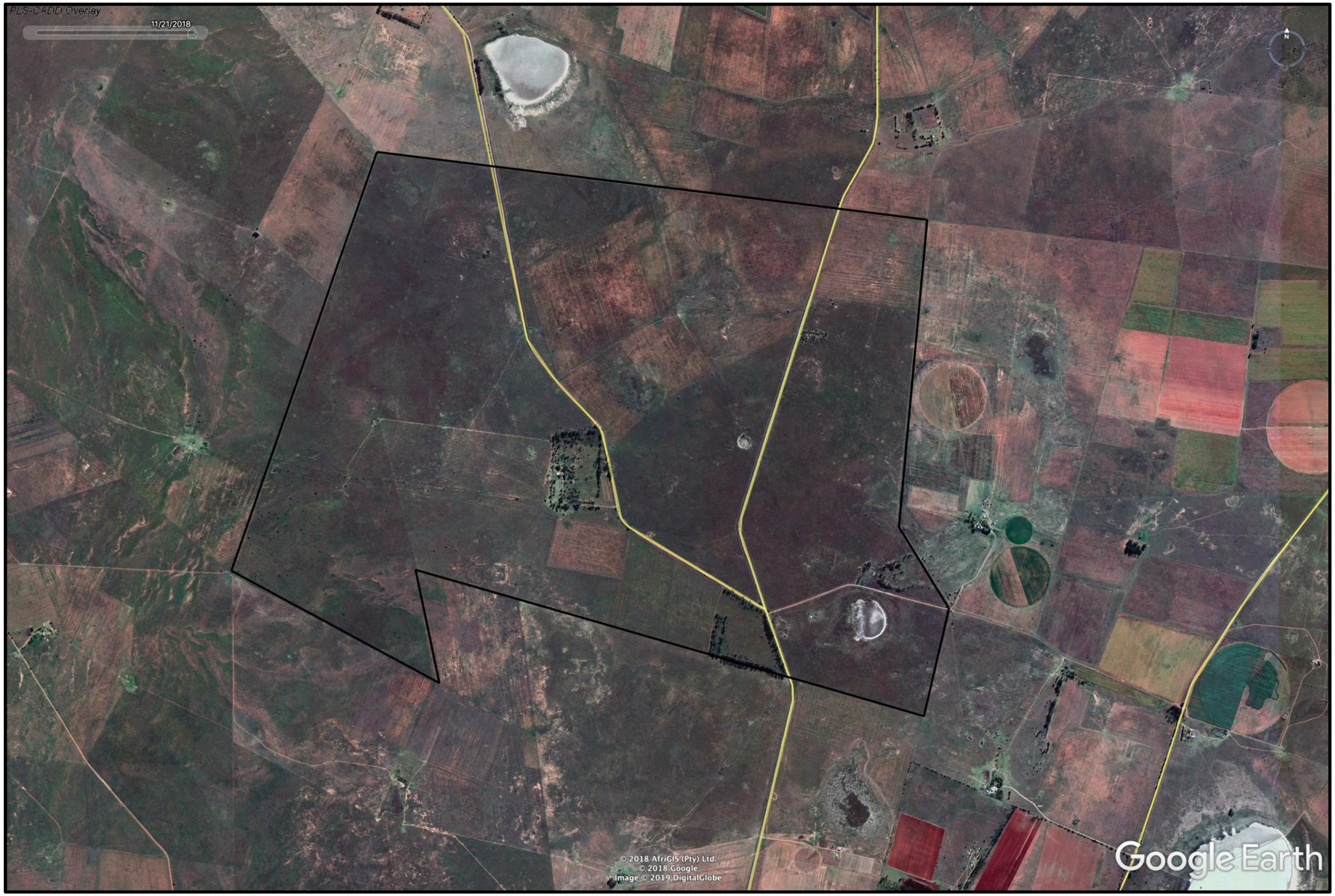

Figure 3. Aerial image (Google Earth ™) of Visserspan 40, black boundary, dissected by two main gravel roads.

3.2 Topography, Geology and Soils

The topography of Visserspan 40 is relatively flat with a slight rise to the southwest corner of the farm. A few depressions are found and they form seasonal pans.

The geology consists of aeolian and colluvial sand that has been laid down over sandstone, shale and mudstone of the Karoo Supergroup, mostly Ecca Group. The soil forms are mostly Avalon, Westleigh and Clovelly. Dolerite has intruded the landscape where Vaal-Vet Sandy Grassland occurs (Figure 4) but it does not occur at Visserspan 40 except for a small outcrop in the southwest corner of the farm that is not prominent enough to be mapped.

Figure 4. Geological map of Visserspan 40. The farm lies on sand over shale and mudstone (unshaded). The orange areas represent dolerite intrusions of which there are none significant at Visserspan 40.

3.3 Climate

Visserspan 40 is located in the summer rainfall region and the climate is classified as warm-temperate. Overall mean annual precipitation (MAP) is 530 mm and temperatures are high in summer and low in winter with severe frosts on average for 37 days of the year. The climate diagram (Figure 5) shows the complete lack of rainfall in winter and rain mainly occurring from November to March.

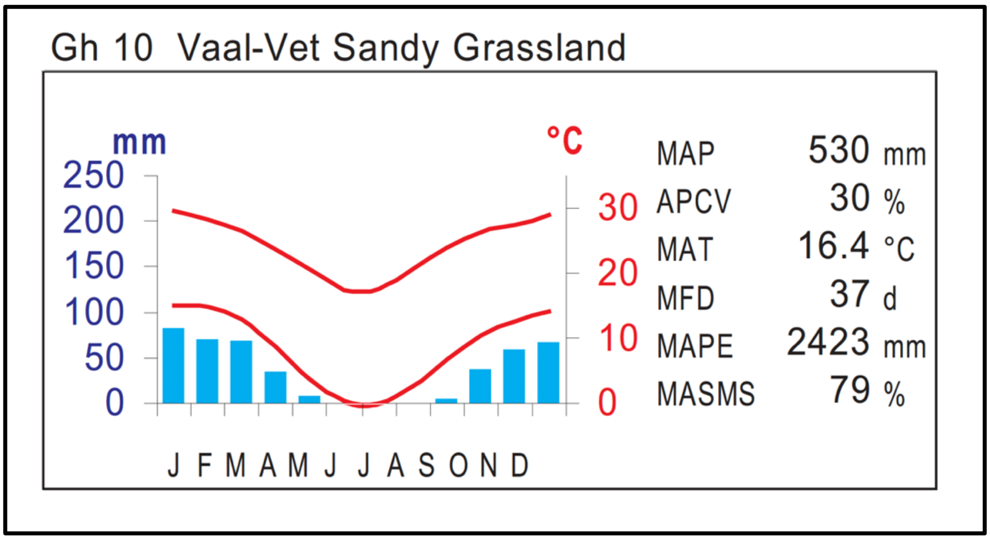

Figure 5. Climate diagram for Vaal-Vet Sandy Grassland the vegetation in the study area (Mucina *et al.* 2006 in Mucina & Rutherford, 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

4. Methods

4.1 Desk-top analysis and reporting

The recorded waypoints during the field survey in November 2018 were transferred to Google Earth ™ satellite aerial-photographs and together with the photographs obtained in the field as well as and available literature, were used for description of the vegetation and compiling the maps presented in this report. The National Vegetation Map (SANBI, 2012; 2018) (referred to as VEGMAP) was used as the base-map for vegetation mapping.

As part of the desktop study an initial appraisal of the Visserspan 40 study area was done using Google Earth ™ imagery to determine where the proposed solar photovoltaic (PV) installations could be placed. This exercise revealed that Visserspan 40 had areas that were cultivated in the past and these areas were targeted as the possible 'PV build' areas. The first map produced is shown in Figure 6 with four areas that were determined as possibilities. However, it was still recognized that this was not the final word on where solar PV installations could or should be built. It was further recognized that a field assessment would be necessary to 'test' this preliminary desk-top analysis and to determine which areas of the farm were botanically sensitive and which were not.

4.2 Field Sampling

The field-work for the assessment of Visserspan was carried out over two days, 20 and 21 November 2018. This was not the ideal time for the study since the vegetation was still dry and the summer rains had not yet started to fall. Season of survey was therefore a **moderate limitation** since the majority of species could not be identified and the summer-growing herbs and forbs were not yet in evidence. However, the natural vegetation was satisfactorily characterized on the basis of dominant grasses that were positively identified.

The study area was accessed using a 4x4 vehicle and on foot. The method used was a 'rapid-assessment technique' in which site observations and numerous photographs were taken at randomly distributed waypoints. The survey tracks and waypoints are shown in Figure 7.

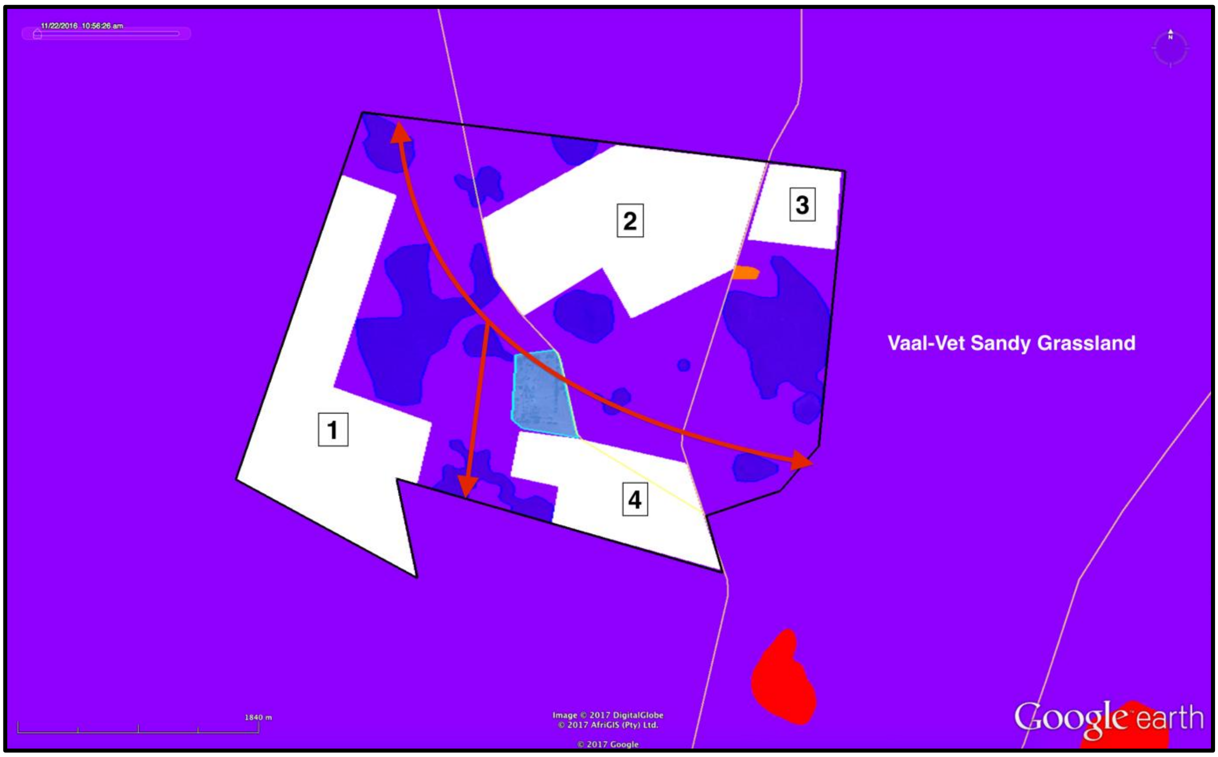

Figure 6. Preliminary map (from desktop analysis) showing possible build areas for solar PV.

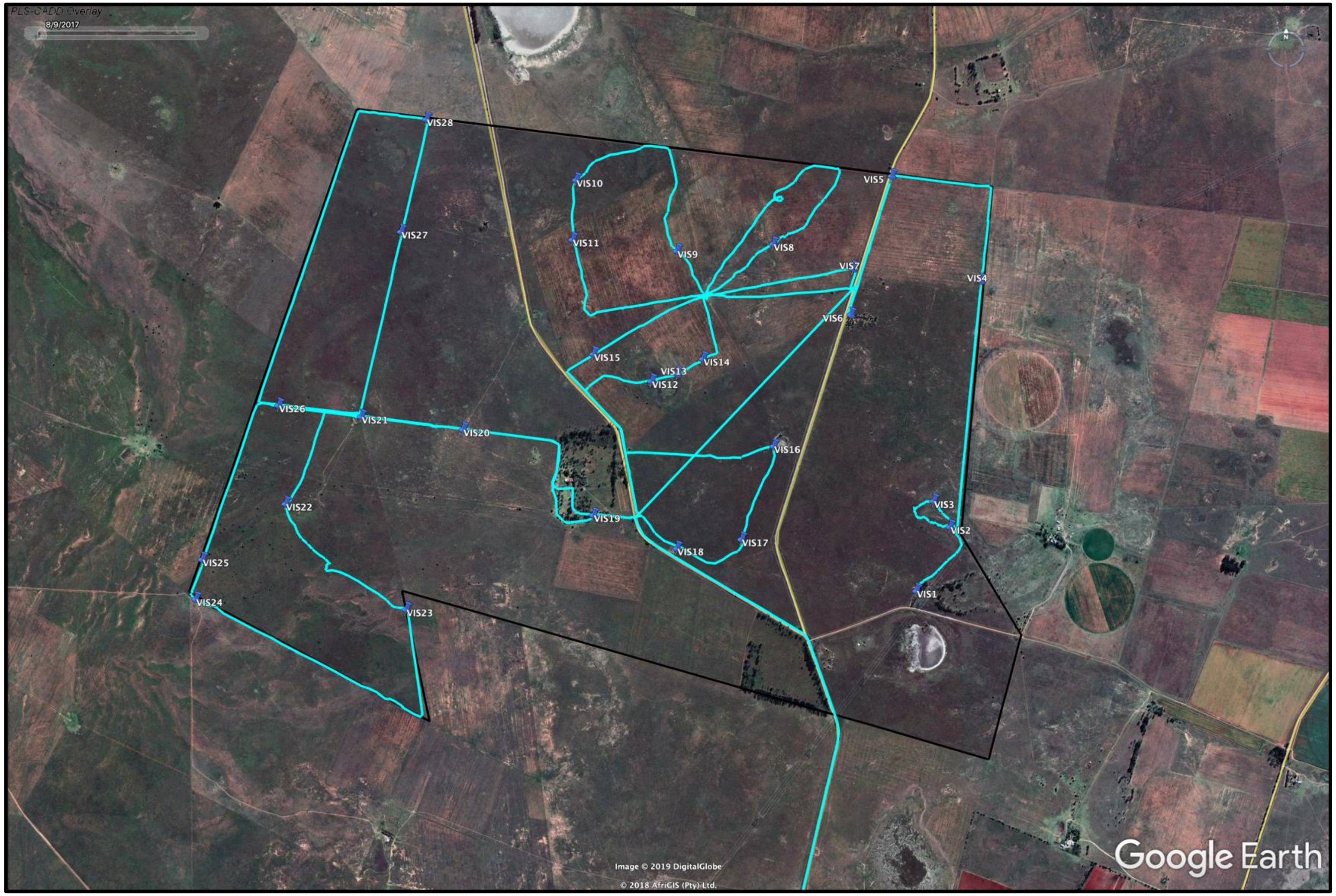

Figure 7. Aerial image from Google Earth ™ of Visserspan 40 (black outline) with the survey track and waypoints (light blue) recorded during the botanical survey in November 2018.

5. Botanical evaluation of the study area

5.1 General description

The vegetation of Visserspan falls firmly within the area mapped as Vaal-Vet Sandy Grassland (SANBI, 2012; 2018) (Figure 8) and this was confirmed during the field-survey.

Vaal-Vet Sandy Grassland, as the name indicates, is a low grassland formation, dominated by C4 grasses. These are grasses adapted to warm-temperate to sub-tropical conditions. This vegetation type typically has a low diversity of shrubs and forbs.

Species listed for this vegetation type by Mucina *et al.* (2006) include the following:

Grasses:

Anthephora pubescens, Aristida congesta, Brachiaria serrata, Chloris virgata, Cymbopogon caesius, Cymbopogon pospischilii, Cynodon dactylon, Digitaria argyrograpta, Digitaria eriantha, Eragrostis chloromelas, E. curvula, E. lehmanniana, E. obtusa, E. plana, E. superba, E. trichophora, Elionurus muticus, Heteropogon contortus, Panicum coloratum, Panicum gilvum, Pogonarthria squarrosa, Setaria sphacelata, Themeda triandra, Tragus berteronianus, Trichoneura grandiglumis, Triraphis andropogonoides.

Herbs:

Barleria macrostegia, Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Geigeria aspera var. aspera, Helichrysum caespititum, Hermannia depressa, Hibiscus pusillus, Monsonia burkeana, Rhynchosia adenodes, Selago densiflora, Stachys spathulata, Vernonia oligocephala.

Geophytic herbs:

Bulbine narcissifolia, Ledebouria marginata

Succulent herbs:

Tripteris aghillana var. integrifolia

Low shrubs:

Anthospermum rigidum subsp. pumilum, Felicia muricata, Helichrysum dregeanum, H. paronychioides, Pentzia globosa, Ziziphus zeyheriana

Herb:
Lessertia philipsiana (endemic)

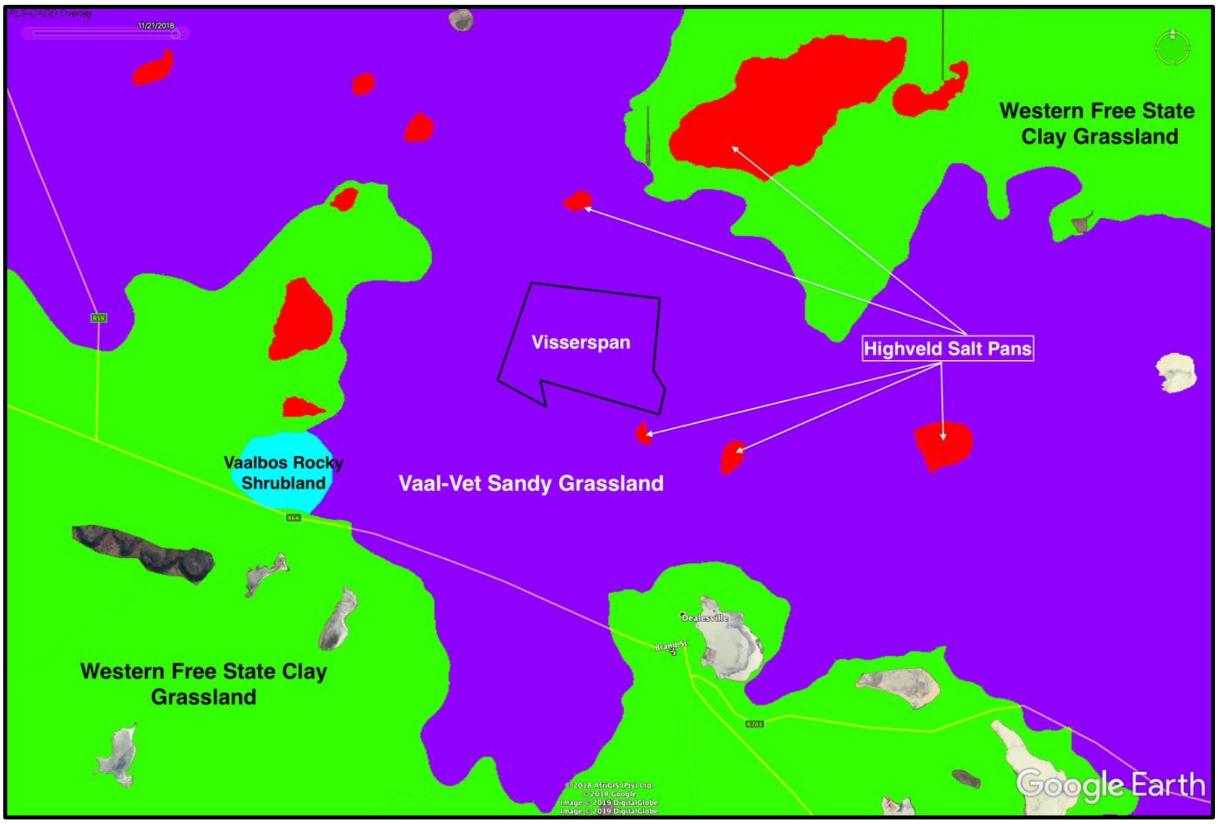

Figure 8. Extract from the Vegetation Map of South Africa, Lesotho & Swaziland (Mucina *et al.* 2005; SANBI, 2012; 2018) (VEGMAP) indicating the location of Visserspan 40 in Vaal-Vet Sandy Grassland.

5.2 Vegetation recorded at sample waypoints

From the field survey it was determined that the area in the southwest of the farm that is slightly elevated and rockier than the rest of the farm was more botanically and edaphically different. It was the only area where trees were found, in this case mature trees of *Vachellia karoo* (sweet-thorn).

The entire survey comprised 28 ‘waypoint samples’. Reference should be made to Figure 7 for the location of all the respective waypoints. The waypoints within Visserspan Solar PV Project 3 are given in Table 1 with descriptions and photographic illustrations. The waypoint samples in the Project 3 area were VIS7, VIS8, VIS9, VIS10 and VS11.

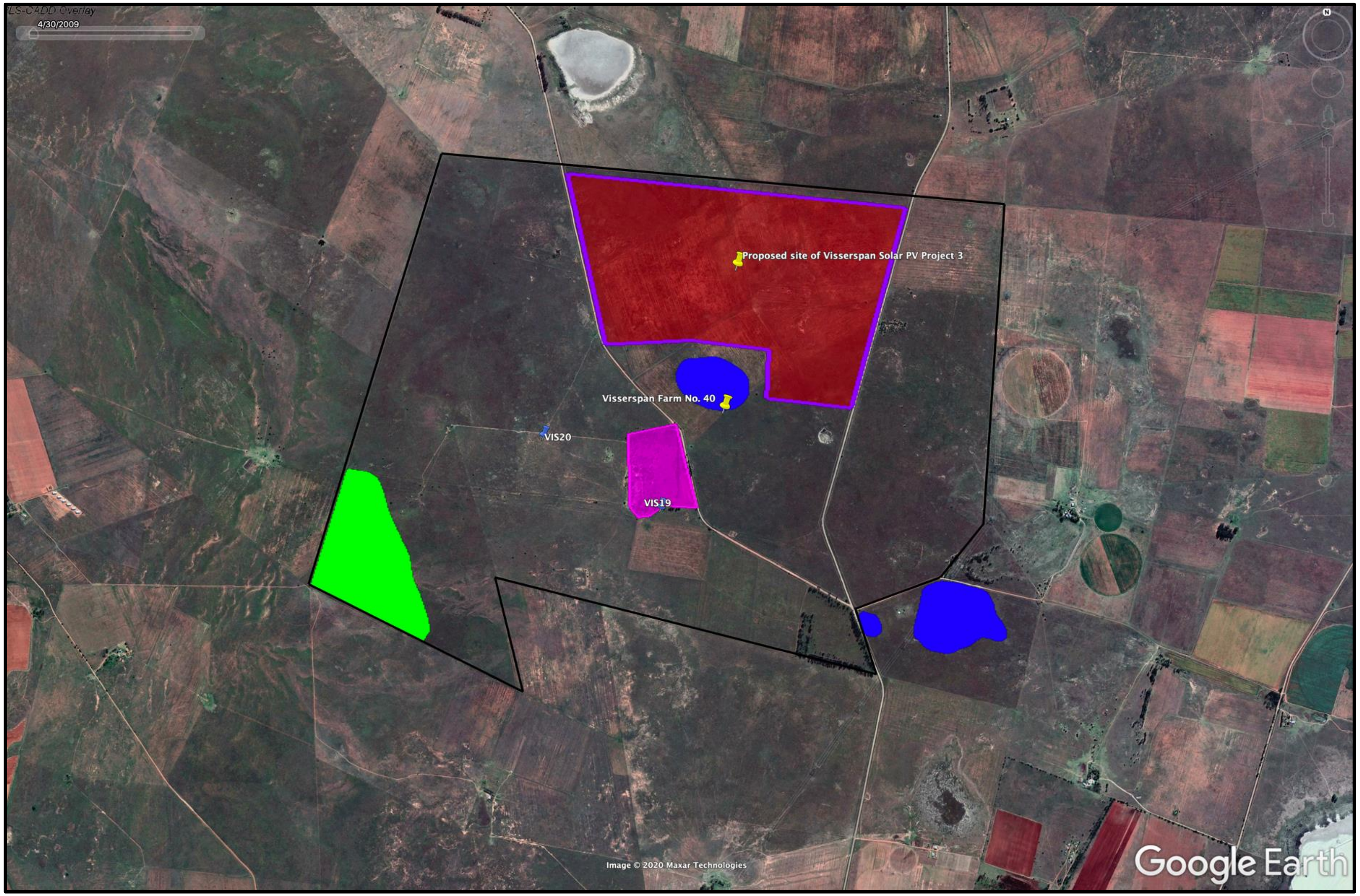

Figure 9. Aerial image from Google Earth ™ of Visserspan 40, with the Solar PV Project 3 shown in red with purple boundary and the 'No Go' area shown in green. The dark blue areas are pans (also 'No Go'). The pink area is the area around the farmstead.

Table 1. The vegetation and habitat found at the sample waypoints in Visserspan Solar PV Project 3.

Waypoint	Co-ordinates	Illustration
VIS7	S 28° 35'21.9 " E 25° 45' 06.6"	
VIS8	S 28° 35'17.3 " E 25° 44' 49.5"	
VIS9	S 28° 35'18.6" E 25° 44' 28.9"	

VIS10	S 28° 35’05.3“ E 25° 44’ 07.4”	
VIS11	S 28° 35’16.5 “ E 25° 44’ 06.6”	

By comparing the samples (species composition and physiognomy) of the respective waypoints in Table 1, it was determined that there is a high degree of uniformity in the structure and species composition in the vegetation of the Solar PV Project 3 area. Good-condition grassland covers the greater part of the area investigated; the vegetation is typical Vaal-Vet Sandy Grassland. No pans were found in this area and the soils were similar throughout (determined from surface appearance and not soil pits) being red-brown sandy-loam soils. Alien invasive shrubs namely *Prosopis glandulosus* var. *torreyana* were encountered sporadically and their presence is attributed to historical disturbance by ploughing and consumption of the pods by livestock that transport the seeds.

Figure 10. *Prosopis glandulosa* var. *torreyana* (Honey mesquite) – an alien invader species.

6. Conservation Status and Vegetation Sensitivity

The vegetation, Vaal-Vet Sandy Grassland, is listed as **Endangered A1** in the National List of Threatened Ecosystems (Government Gazette, 2011). The critical biodiversity areas (CBA) map for the Visserspan 40 study area from the Free State: Department of Small Business Development, Tourism and Environmental Affairs, was overlaid on a Google Earth ™ image and examined to compare what was observed in the field with the aerial image and overlaid CBA map (Figure 11). The presence of CBAs and ESAs (Ecological Support Areas) suggests that areas where they have been mapped are ecologically sensitive. However, that is not always the case.

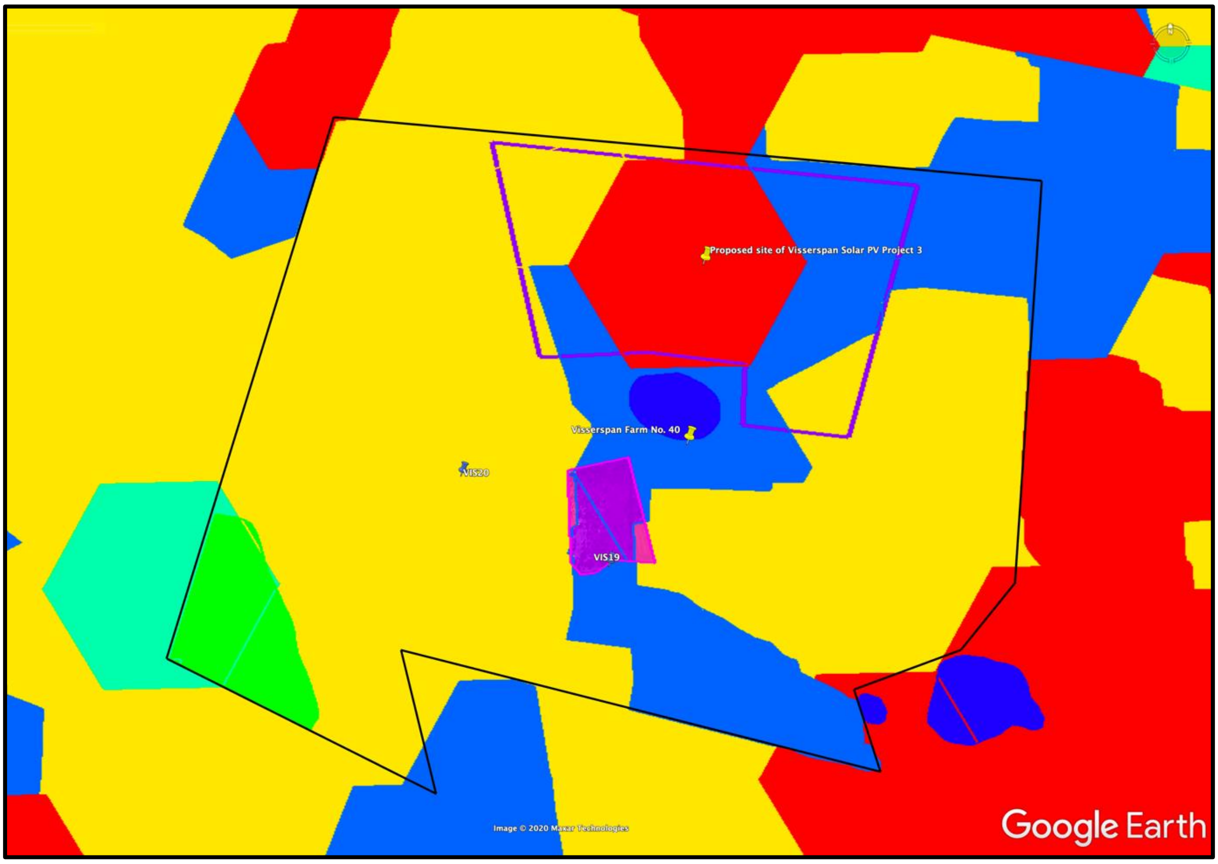

Figure 11. Conservation status map showing Critical Biodiversity Areas (CBA1) in yellow, CBA2 area in red, degraded areas in dark blue and 'other vegetation' in light green. The Project 3 area is shown with a purple boundary.

From the field-survey a map was compiled that represents the status as determined from 'on-the-ground' observations (Figure 12). This map indicates areas of low sensitivity that can be considered for building PV installations, pans that are areas of high sensitivity that should be buffered (32 m minimum) and a No-Go area in the southwest. The areas that are mapped as 'degraded' in Figure 11 are, in my opinion, no longer degraded since they have successfully reverted to Vaal-Vet Sandy Grassland (good condition). This is true for the area mapped as an

Ecological Support Area (ESA) as well. It is my view, therefore, that the CBA map (Figure 11), requires rigorous testing and revision. In its current form it does not represent what is found in reality.

The sensitivity map (Figure 12) was used to inform the solar PV development areas. The solar PV Project 3 area is shown in Figures 9 & 11 as the area with a purple boundary in the northern part of the farm. Although it is in an area classified and mapped as a CBA1 area, my findings were (as in Figure 12) that the area does not warrant CBA1 status and is suitable for building a solar PV installation. The centrally located pan was specifically avoided in delimiting the Solar PV Project 3 area.

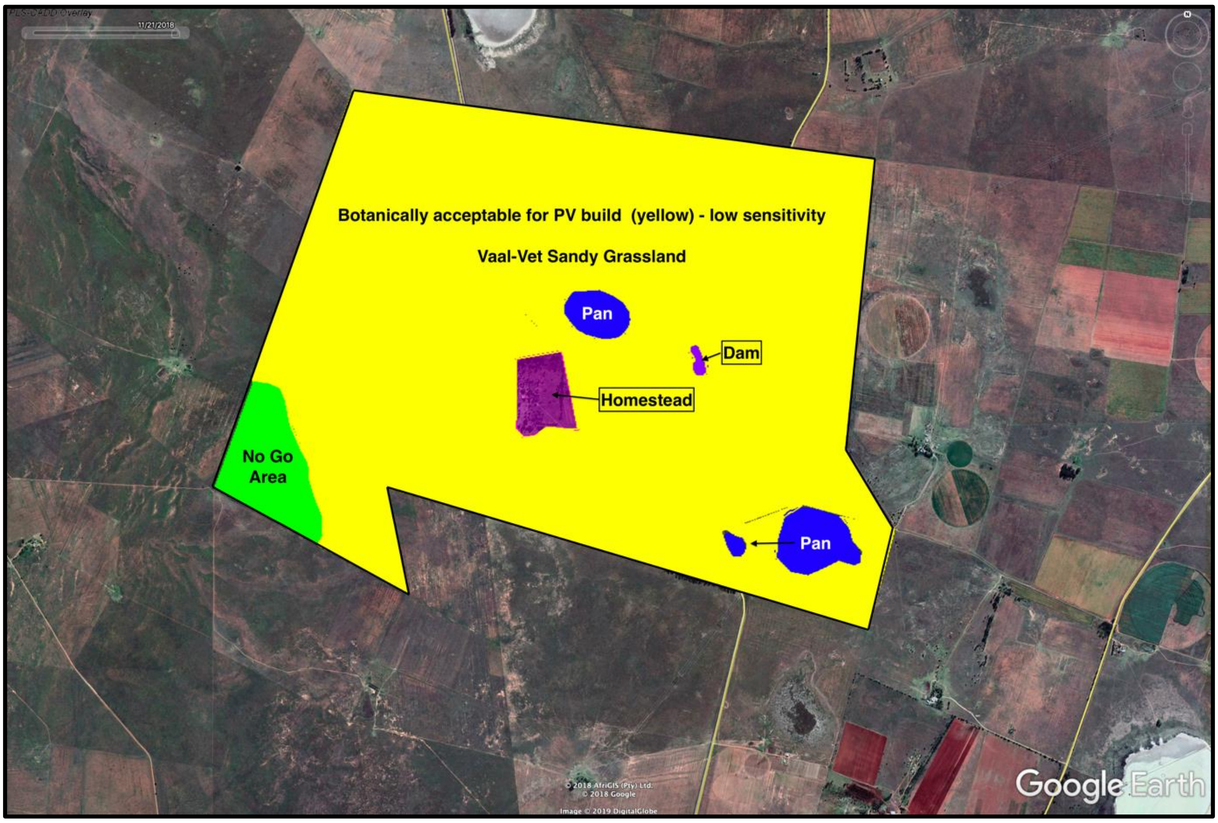

Figure 12. Botanical sensitivity map determined from the botanical field-survey of November 2018.

7. Impact Assessment

Impacts on the vegetation for the Solar PV Project 1 are assessed for the clearing of existing vegetation for solar PV construction. The 'No Go' alternative is also assessed.

7.1 'No Go' Alternative

In the case of the **"No Go" alternative** for the Visserspan Solar PV Project 3 area no development would take place and the *status quo* of farming with cattle would persist. The impact would be **Very Low Negative** since the farm is well managed, not overgrazed and has veld that is in good condition.

The 'No Go' alternative is included in the assessment tables.

7.2 Direct Impacts

7.2.1 Direct impacts as a result of the construction and operation of Visserspan Solar PV Project 3.

Only the development (preferred) alternative and the 'No Go' are assessed for Visserspan Solar PV Project 3. No other alternatives have been proposed.

Direct impacts are those that would occur directly on the natural vegetation, habitat and ecological processes as a result of the clearing of grassland vegetation and then construction and operation of the Solar PV 2 installation. In addition to determining the individual impacts using various criteria, mitigation is also brought into the assessment.

The development of the preferred alternative of Visserspan Solar Project PV2 would result in loss of approximately 223 ha of Vaal-Vet Sandy Grassland. This negative impact is considered to be **High Negative** because of the total loss of the ecologically functional grassland. This impact may be reduced to **Medium Negative** by mitigation although minimal mitigation would be possible. The only mitigation would be to leave corridors of grassland vegetation between the rows of PV panels. These would act as 'biological corridors' within the solar panel array that would permit the grasses to persist and the other biota (small mammals and birds) to use the corridors. The downside is that the grassland is susceptible to fire and so retaining any grass cover between the panels would pose a high risk of damage by wildfire and this would not be desirable. Since the 'mitigation' of leaving some area with intact grassland within the solar PV array would not be prudent, the impact would remain **High Negative** (Table 2).

Table 2. Impact and Significance – Loss of Vaal-Vet Sandy Grassland as a result of clearing for construction and operation of the Visserspan Solar PV Project 3.

CRITERIA	'NO GO' ALTERNATIVE	PREFERRED ALTERNATIVE: SOLAR PV PROJECT 3	
Nature of direct impact (local scale)	**Loss of Vaal-Vet Sandy Grassland**		
		WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local
Duration	Long-term	Long-term	Long-term
Intensity	Low	High	High
Probability of occurrence	Probable	Probable	Probable
Confidence	High	High	High
Significance	Low negative	High negative	High negative
Nature of Cumulative impact	**Loss of Vaal-Vet Sandy Grassland**		
Cumulative impact prior to mitigation	Medium		
Degree to which impact can be reversed	Reversible if / when solar PV panels would be removed		
Degree to which impact may cause irreplaceable loss of resources	Low		
Degree to which impact can be mitigated	Low		
Proposed mitigation	The only possible mitigation of keeping some grassland between the solar panels would not be feasible due to the risk of fire.		
Cumulative impact post mitigation	Low negative		
Significance of cumulative impact (broad scale) after mitigation	Low negative		

8. Discussion

The botanical survey of Visserspan 40 in November 2018 (McDonald, 2019) was aimed at determining (i) the vegetation type(s) and condition; (ii) the veracity of the existing CBA (conservation status) map; (ii) the sensitivity of the vegetation and (iv) areas that could be considered for the construction of a PV facility.

As described, only one vegetation type, Vaal-Vet Sandy Grassland, occurs on Visserspan 40. However, a small variant occurs in the southwest corner, where trees of *Vachellia karoo* are present. This area was identified as a 'No Go' area and was thus avoided when selecting the Solar PV Project 1 area.

Owing to the widespread occurrence of the principal vegetation type, Vaal-Vet Sandy Grassland, I hold the view that this vegetation is not sensitive at Visserspan. I therefore question the CBA1 classification imposed on parts of the farm. I also contend that the ESA areas and degraded areas are incorrectly mapped.

In view of the above, it is my professional view that the areas shaded yellow in Figure 11 could all be considered for construction of solar PV infrastructure. It was on this basis that the area for the Visserspan Solar PV Project 3 was determined.

The Vaal-Vet Sandy Grassland at Visserspan 40 is Endangered A1 (Government Gazette, 2011) and there would be high local loss of this vegetation type (habitat) and loss of ecological functionality. Mitigation options are minimal to zero and the impact at a local scale is thus **High Negative**, which cannot be avoided.

9. Conclusions

An initial study was carried out by the author in November 2018 and reported in February 2019 (McDonald, 2019). This study was primarily a survey of the vegetation and habitat at Visserspan 40 to determine the sensitivity and constraints on building the proposed solar PV infrastructure.

The areas now determined for solar PV development were informed by the above study and an impact assessment carried out (this report).

The conclusion is that even though the area of Visserspan Solar PV Project 3 is acceptable for building renewable energy infrastructure, the impact of clearing of the vegetation would still be **High Negative**. No meaningful mitigation measures would be possible. The only thing that can be hoped for is that, as stated by McDonald (2019): "*The objective must be to build the solar PV installations as sensitively as possible despite the vegetation in the area ~~not~~ being a threatened ecosystem."*

Since the Vaal-Vet Sandy Grassland is an extensive system and not confined to Visserspan, the cumulative impact would be **Low Negative** and the loss of resources would be low. Consequently, the development of the Solar PV Project 3 at Visserspan is supported from a botanical (vegetation) perspective.

10. References

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

South African National Biodiversity Institute (SANBI) 2012, 2018; 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: 14 February 2020

Appendix 1: Impact Assessment Methodology

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

- The nature of the impact – see Table A.1
- The magnitude (or severity) of the impact – see Table A.2
- The likelihood of the impact occurring - see Table A.2

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

TableA.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 A.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 A.3 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 A.4*, the various definitions for significance of an impact is given.

Table A.4 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 982, as amended.

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 and Page 2
	(ii) The expertise of that specialist to compile a specialist report, including a CV.	Page 2 and 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 12
1 (1)(cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Page 20
1 (1) (d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Pages 11 & 12
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; Appendix 1
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 14--21

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (g)	An identification of any areas to be avoided, including buffers.	Pages 19
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.	Pages 16 & 18
1 (1) (i)	A description of any assumptions made and any uncertainties or gaps in knowledge.	Page 12
1 (1) (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	Pages 14--21
1 (1) (k)	Any mitigation measures for inclusion in the EMPr.	Page 20
1 (1) (l)	Any conditions for inclusion in the environmental authorisation.	N/A
1 (1) (m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
1 (1) (n)	A reasoned opinion- (i) whether the proposed activity, activities or portions thereof should be authorised; and	Page 22
	(iA) regarding the acceptability of the proposed activity or activities; and	Page 22
	(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	N/A
1 (1) (o)	A description of any consultation process that was undertaken during the course of preparing the specialist report	None

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (p)	A summary and copies of any comments received during any consultation process and where applicable, all responses thereto	N/A
1 (1) (q)	Any other information requested by the competent authority	Not requested

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

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

Membership in Professional Societies:

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

Key Qualifications:

- Qualified with a M. Sc. (1983) in Botany and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute).
- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.

- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications; involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.
- Further tasks involved the day-to-day management of a large non-profit environmental organisation.
- **Independent botanical consultant** (2005 – to present) over 300 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is available on request.

Higher Education

Degrees obtained
and major subjects passed:

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

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

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

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

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

Employment Record:

January 2006 – present: Independent specialist botanical consultant and tour guide in own company: **Bergwind Botanical Surveys & Tours CC**

August 2000 - 2005 : Deputy Director, later Director Botanical & Communication Programmes, Botanical Society of South Africa

January 1981 – July 2000 : Research Scientist (Vegetation Ecology) at National Botanical Institute

January 1979—Dec 1980 : National Military Service

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