

**Botanical Impact Assessment
Veld PV North, near Aggeneys
Northern Cape Province**



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Aurecon South Africa (Pty) Ltd

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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, as amended.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by Aurecon South Africa (Pty) Ltd ("Aurecon") to provide specialist botanical consulting services for the assessment of the area of the proposed Veld PV North near Aggeneys, Northern Cape Province.

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- 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 2

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

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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 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:

13 August 2019

Date:

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1. Background and Brief

Bergwind Botanical Surveys & Tours CC was appointed by Aurecon to undertake a botanical study (scoping and botanical impact assessment) for a proposed solar project known as the Veld PV North (original study area) on Farm Naroep (Remainder of Farm 45) and Veld PV North ('new focus area'). The area of interest is approximately 20 km north-west of Aggeneys, in the Khai-ma Local Municipality, Namaqua District Municipality, Northern Cape Province. The proponent proposes to develop three solar farms that would consist of one concentrated solar power facility (CSP) and two photovoltaic (PV) energy facilities with associated infrastructure. These farms would have a maximum generation capacity of up to 150 MW for the CSP and 75 MW each for the PV with a combined generation capacity of up to 300 MW. The development has been designed with the intention that the solar farms would make up a consolidated development, known as 'the proposed Namakwa 300 MW Combined Solar Technology Facility', and would utilise shared infrastructure where possible to minimise their overall footprint and associated impacts. However, each project is assessed as a standalone project so that each could be constructed under its own approvals, should this be required.

Owing to findings during the scoping phase, the originally area targeted for Veld PV North was found by specialists to be topographically and ecologically sensitive and unsuitable for the proposed PV infrastructure. An alternative was thus sought for Veld PV North as described below. A short description of the vegetation of the 'original' Veld PV North area is provided for reference. However, for clarity the physiography and vegetation of the 'NEW' Veld PV North area is described.

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

The report focuses on the Veld PV North project that would cover approximately 300 ha and would include the following components:

- Numerous arrays of PV solar panels;
- Internal access roads;
- An operations and maintenance building;
- A temporary laydown area;

- An on-site substation, including switching yard;
- Internal cabling laid underground when feasible;
- Site access mostly via existing road (50–80 m long and widened to 6 m); and
- A loop in loop out line would be built between the facility and an existing 220 kV transmission line to the west, approximately 150 m in length.

2. Terms of Reference: Scoping

- Conduct a field evaluation of the target area of the proposed 'Veld PV North'.
- Indicate any constraints, based on the botanical condition of the study area, that would influence the proposed project, either positively or negatively.
- Provide a baseline and impact assessment to evaluate the impacts of the proposed project on any natural vegetation.
- Note any 'red flags' and sensitive plants species (protected trees; threatened species).
- Assess the 'No Go' condition and the direct and cumulative impacts of the proposed project.
- Recommend mitigation measures that should be implemented to compensate for any negative direct impacts.

Note: The report presented here has remained partly unchanged from the scoping report so as to include all the background and investigative work that went into the Scoping Phase. This informed the final selection of the VELD PV North site (at the 'NEW' PV North site as in Figures 14 & 15).

3. Terms of Reference: EIA

- Assess the impact of the proposed layout of the VELD PV North installation now that it has been finalised.
- A road exists from the N14 to the vicinity of the proposed Veld PV North Installation: Assess the impact of the access road from the 'N14 Connector Road' to the PV area.
- Assess the impact of the power lines in the vicinity of VELD PV North.
- Assess the impact of the 132 kV evacuation power line to Aggeneys that would service both VELD PV North and VELD PV South.

4. General Study Area: Veld PV North

4.1 Locality

The general locality is in the Khai-Ma Local Municipality, Namaqua District Municipality, Northern Cape Province north west of Aggeneys and in the area between Pella in the east and Goodhouse in the west. (Figure 1). The study area falls within the region colloquially known as Bushmanland and is at the interface between the Nama Karoo and Desert biomes (Rutherford *et al.* 2006 in Mucina & Rutherford, 2006). The originally proposed 'Veld PV North' solar power installation would have been on the farm Naroep RE/45 (Figures 2, 3, 8, 9 & 10). Figures 3, 8 & 9 show the original target area within the greater 'Veld PV North' study area. The sample track and waypoints recorded are shown in Figure 9. However, due to the complexity of the landscape and its ecological sensitivity, the original Veld PV North 'focus area' was screened out. An alternative 'NEW' Veld PV North focus area was then selected that falls within the greater Veld South PV area on the farm Haramoep RE/53, 1.8 km west of Veld PV South (Figures 14 & 15).

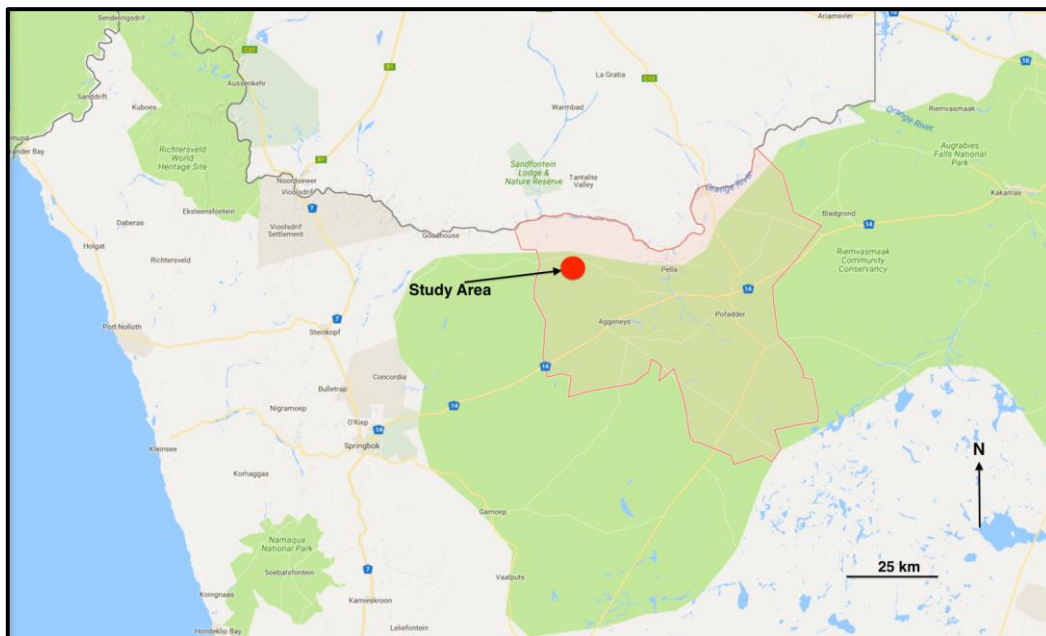


Figure 1. General locality of the study area north-west of Aggeneys the Khai Ma Local Municipality, Namaqua District Municipality Northern Cape Province.

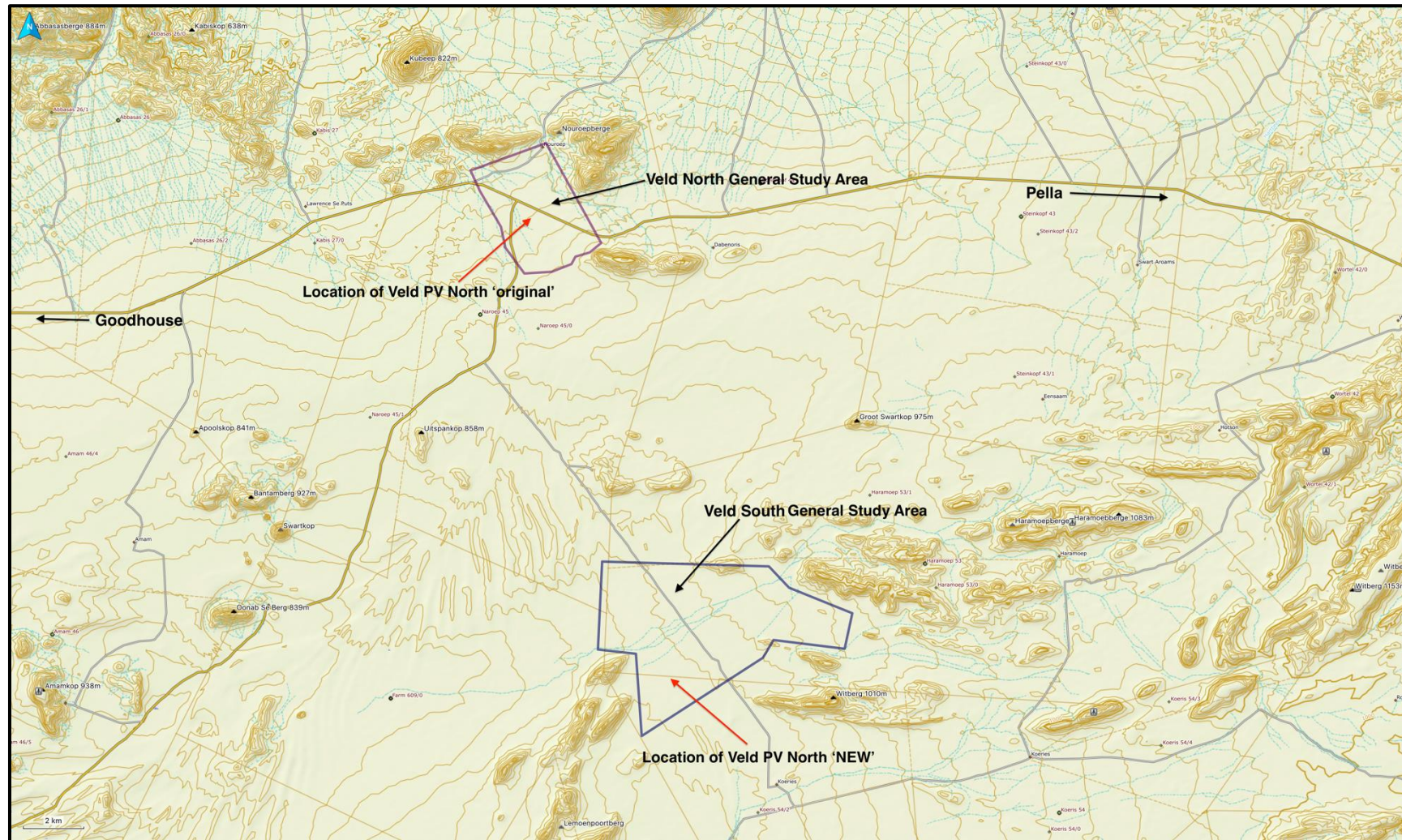


Figure 2. Topographic map showing the location of the general Veld North PV and Veld South PV areas on the farms Naroep and Haramoep in the Khai Ma Local Municipality, Northern Cape Province. The 'original' and 'new' locations for Veld PV North are indicated by red arrows.

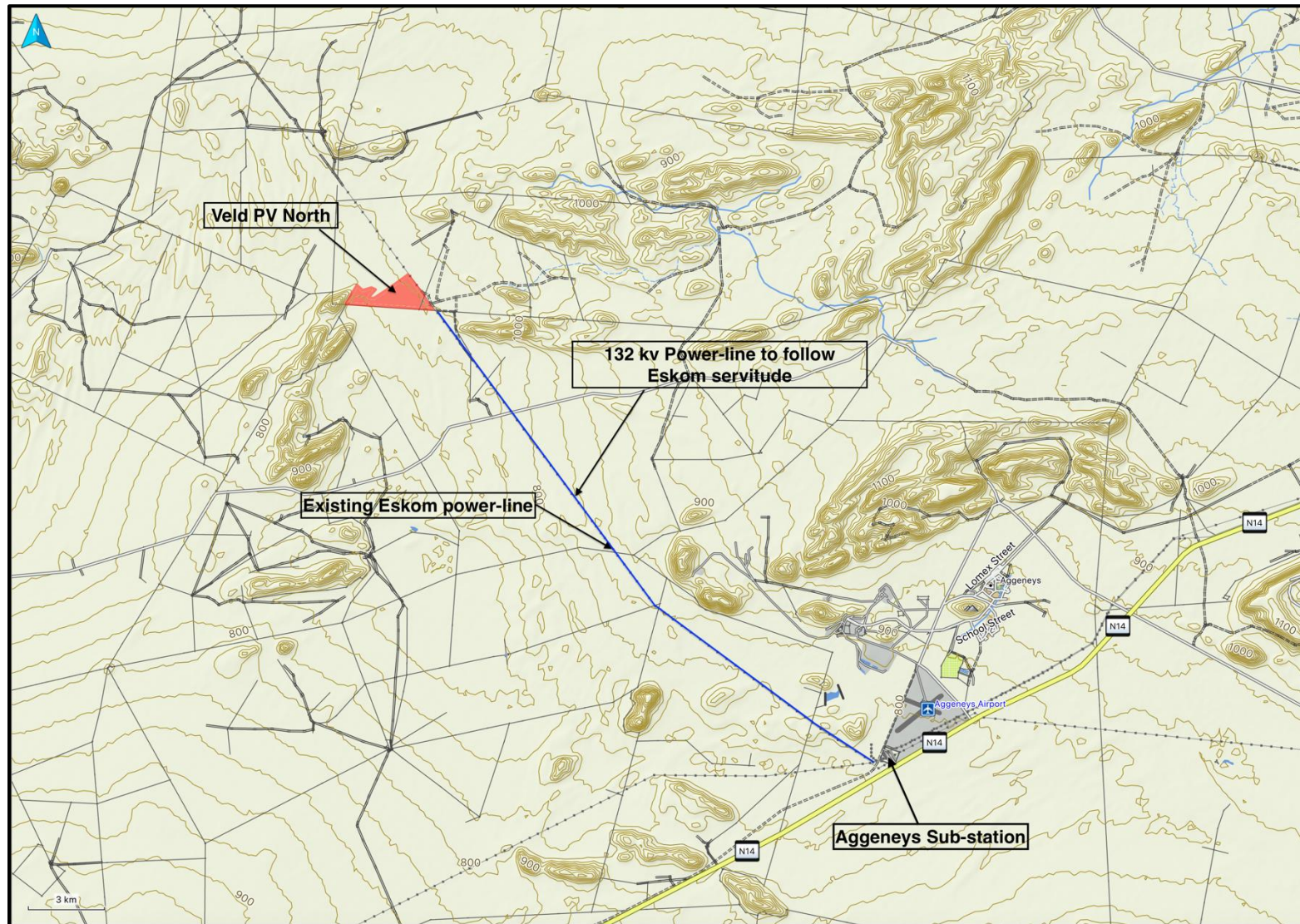


Figure 3. Map showing the location of Veld PV North on Haramoep RE/53 in relation to Aggeneys.

4.2 Locality and Description of the 'ORIGINAL' Veld PV North area.

The area originally selected for the Veld PV North is located on the Farm Naroep RE/45, south of the road between Pella and Goodhouse (Figure 2) is highly dissected by seasonal watercourses. The topography is therefore uneven and undulating. The dissected landscape has resulted in there being numerous different ecological niches and a highly variable pattern in the vegetation. In addition, the drainage lines support numerous plants of the protected tree, *Boscia albitrunca* (shepherd's tree; witgatboom).

The vegetation of the 'original' Veld PV North area is described as partly Eastern Gariep Rocky Desert and partly Eastern Gariep Plains Desert (Mucina *et al.* 2006) (Figure 10). The eastern section of the 'original' Veld PV North that is Eastern Gariep Plains Desert is not as ecologically sensitive as the Eastern Gariep Rocky Desert in the western part. The eastern section is characterized by a relatively even plain with 'white' grasses (*Stipagrostis* spp. and *Centropodia glauca*) and numerous plants of *Euphorbia gregaria* (Figure 4). In contrast, the western section is more dissected (Figure 5) with notable species being *Boscia albitrunca* (Figure 6) and scattered individuals of *Aloidendron dichotomum* (quiver tree) (Figure 7). Both the latter species are protected whereas no protected species were found in the eastern section.

The variability in the landscape and ecological / botanical sensitivity indicated that this area would not be suitable for the proposed PV infrastructure. Therefore, it was recommended that an alternative area be sought for Veld PV North. This recommendation was followed and the 'NEW' Veld PV North area has been proposed as described below.

The topography of the greater (originally surveyed) Veld PV North area (including the Veld PV North 'focus area') is shown as being relatively flat in Figure 8. In the aerial image of Figure 9, the central dissected part of the Veld PV North (original) is seen. Also in Figure 9 are the sample track and waypoints recorded. The originally proposed layout of the PV installation is shown in Figure 11.



Figure 4. Eastern Gariep Plains Desert in the eastern sector of Veld PV North 'original'.



Figure 4. Eastern Gariep Rocky Desert in the western part of Veld PV North 'original'.



Figure 6. *Boscia albitrunca* (a protected tree) commonly found in Eastern Gariep Rocky Desert in the western part of Veld PV North 'original'.



Figure 7. *Aloidendron dichotomum* (quiver tree) found scattered through the Eastern Gariep Rocky Desert in the western part of Veld PV North 'original'. Note the Sociable Weaver nest in this specimen.

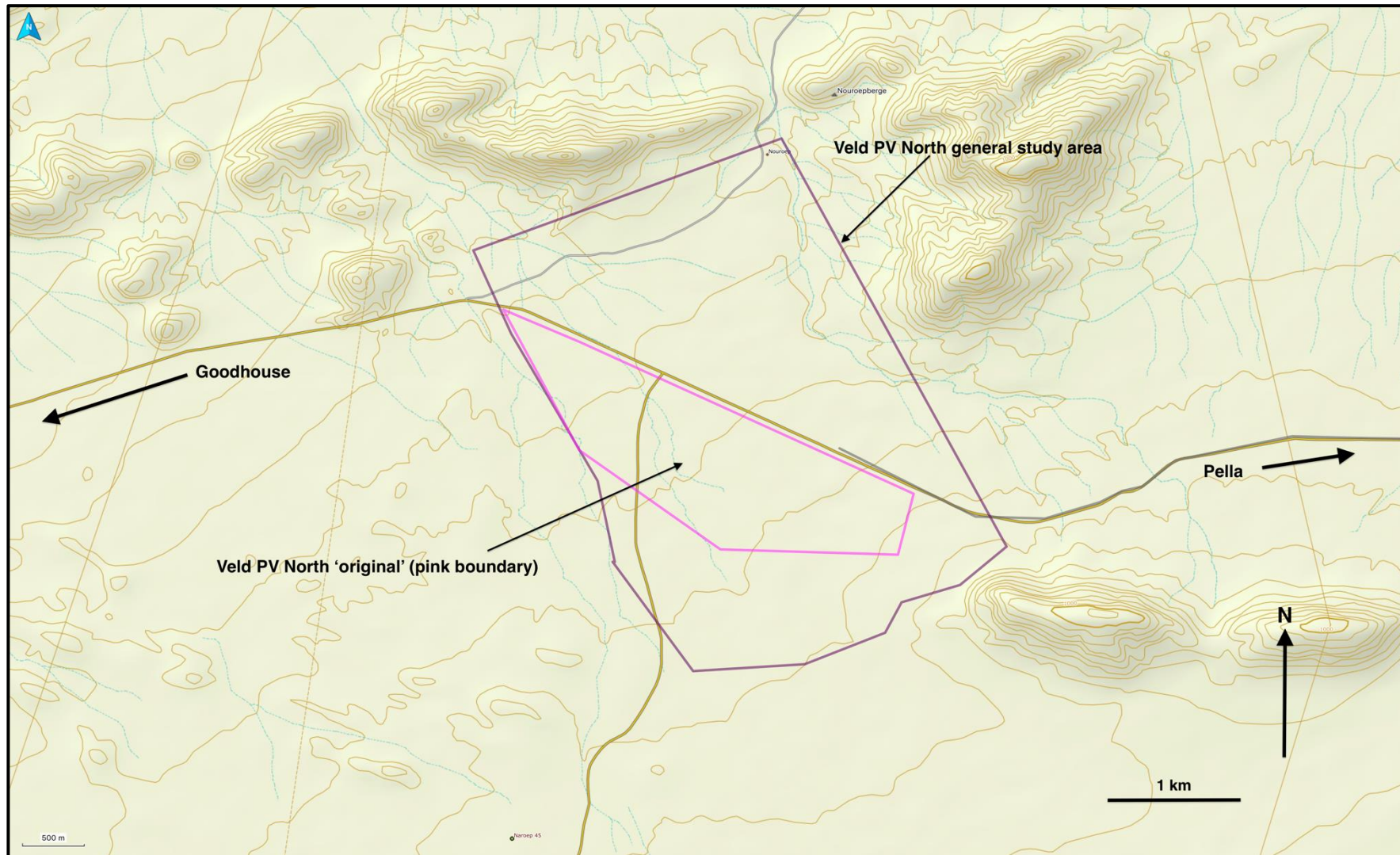


Figure 8. Topographic map of the general Veld PV North study area and the subsidiary Veld PV North 'original' focus area (pink boundary) that lies south of the Pella-Goodhouse road on farm Naroep RE/45.

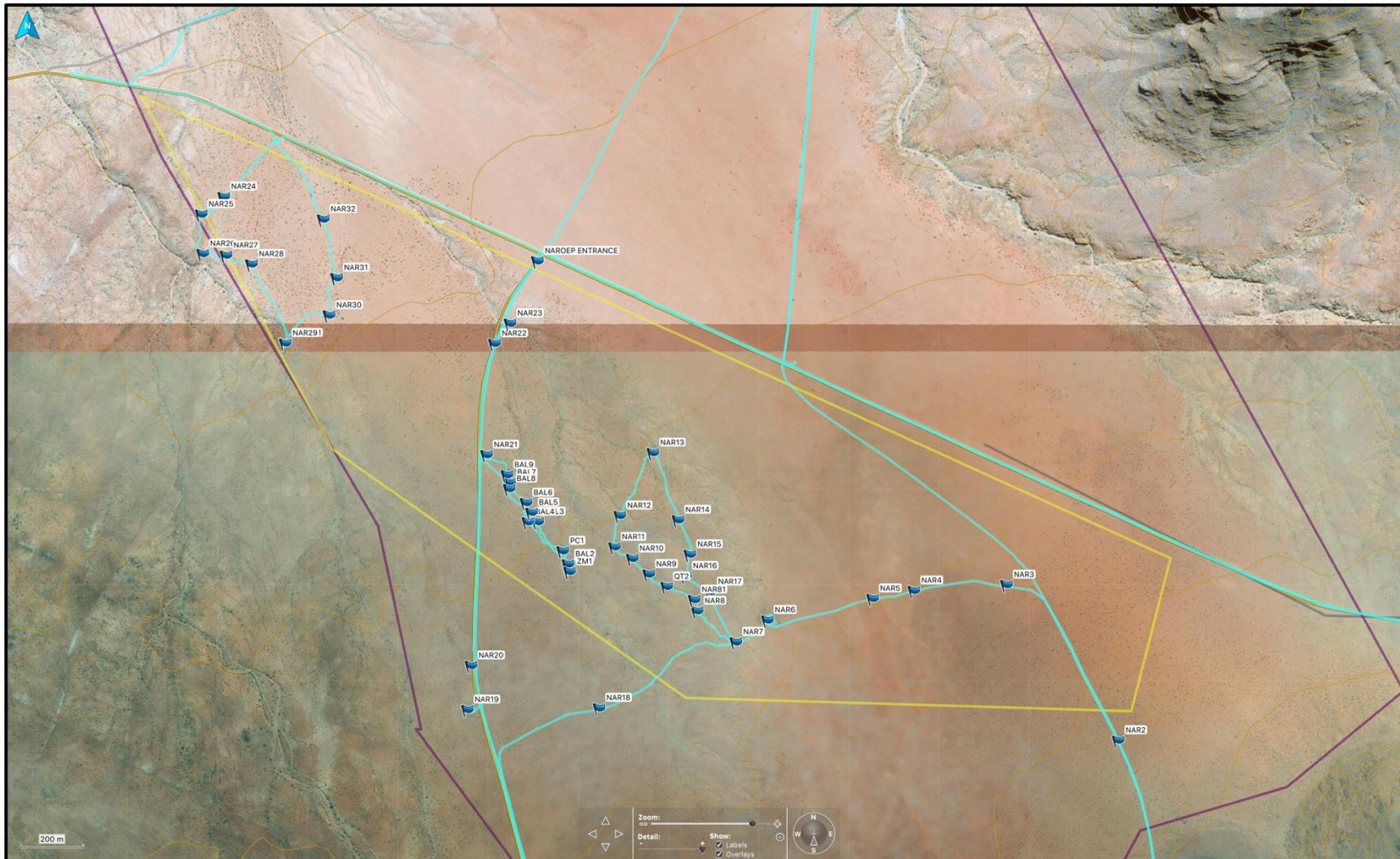


Figure 9. Aerial photograph (Garmin Birdseye image) with the Veld PV North 'original' focus area (yellow boundary) on farm Naroep RE/45 superimposed. The light blue lines are the sample tracks with sample waypoints represented by blue flags (HAR#).

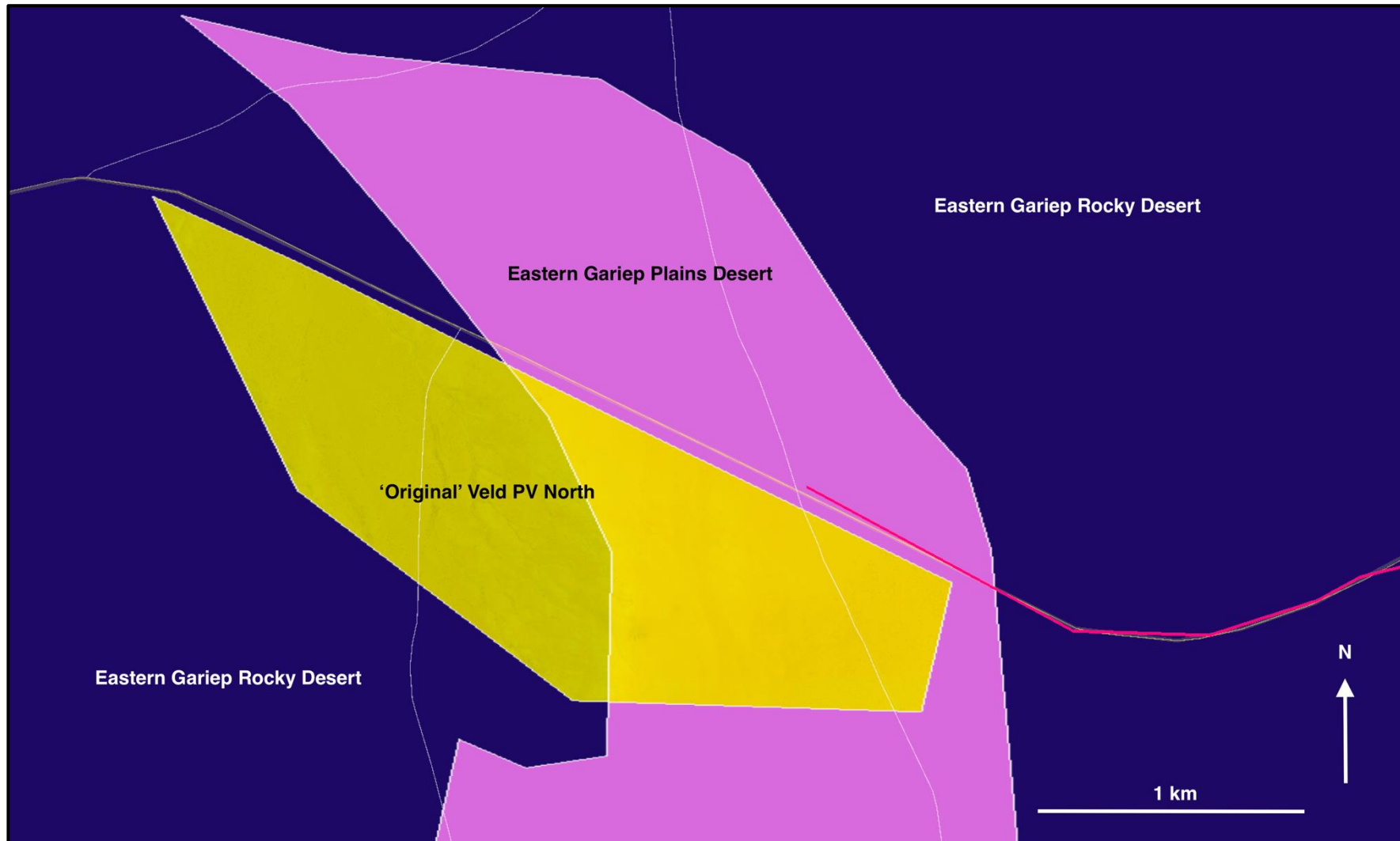


Figure 10. Portion of the Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2012) indicating that the Veld PV North 'original' (yellow shading) straddles Eastern Gariep Plains Desert and Eastern Gariep Rocky Desert.

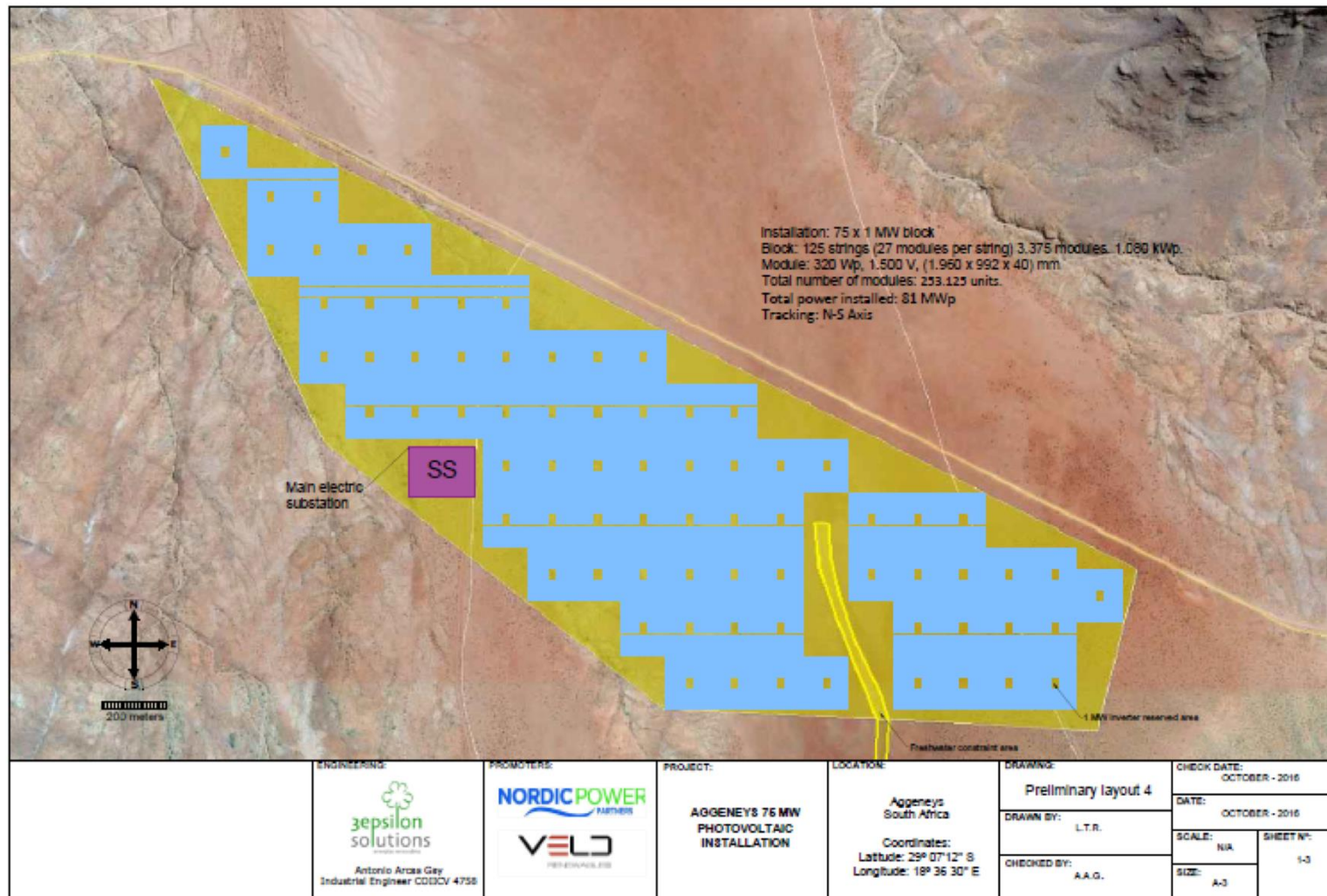


Figure 11. The originally proposed layout of infrastructure for Veld PV North on Naroep RE/45.

4.3 Locality of 'NEW' Veld PV North area

As noted above, the field surveys of a number of specialists indicated that the 'original' area proposed for Veld PV North was not suitable. Therefore, an alternative area was investigated and the proposal is now to place the 'NEW' Veld PV North within the greater Veld PV South study area on the Farm Haramoep RE/53 as shown in Figures 14 & 15. This has become the PREFERRED site.

4.3.1 Topography, Geology and Soils of the 'NEW' Veld PV North area

The geology of the study area is complex due to the underlying granitic-gneissic rocks of the Namaqualand Metamorphic Complex (Namaqua-Natal Province: Cornell *et al.* 2006). These rocks are exposed on the numerous hills surrounding the study area but the Veld PV North 'NEW' focus area is on a relatively flat plain (with shallow drainage southwards) where the red-yellow apedal, freely drained, sandy soils that overlie gneissic granite form a pedisediment i.e. a veneer of sandy-gravel material overlying bedrock.

The land-type over the greater part of the Veld PV South general study area (that includes Veld PV North) is Ae99 and in the east Ae43 (no dunes present) (Figures 12 & 16). Land-type Af20 has recent sand dunes overlying calcrete and gneissic granite (Figures 13 & 16) and land-type Ic150 displays rock with little or no soil (Figure 1). The Veld PV North 'NEW' focus area is located in land-types Ae99 and Af20 (Figure 16).



Figure 12. Relatively flat peneplain with red sandy mantle over granitic-gneissic rocks.



Figure 13. Dunes of recent wind-blown sand found in the south of the greater Veld PV South study area. The main grass species is *Centropodia glauca* (Gha grass)

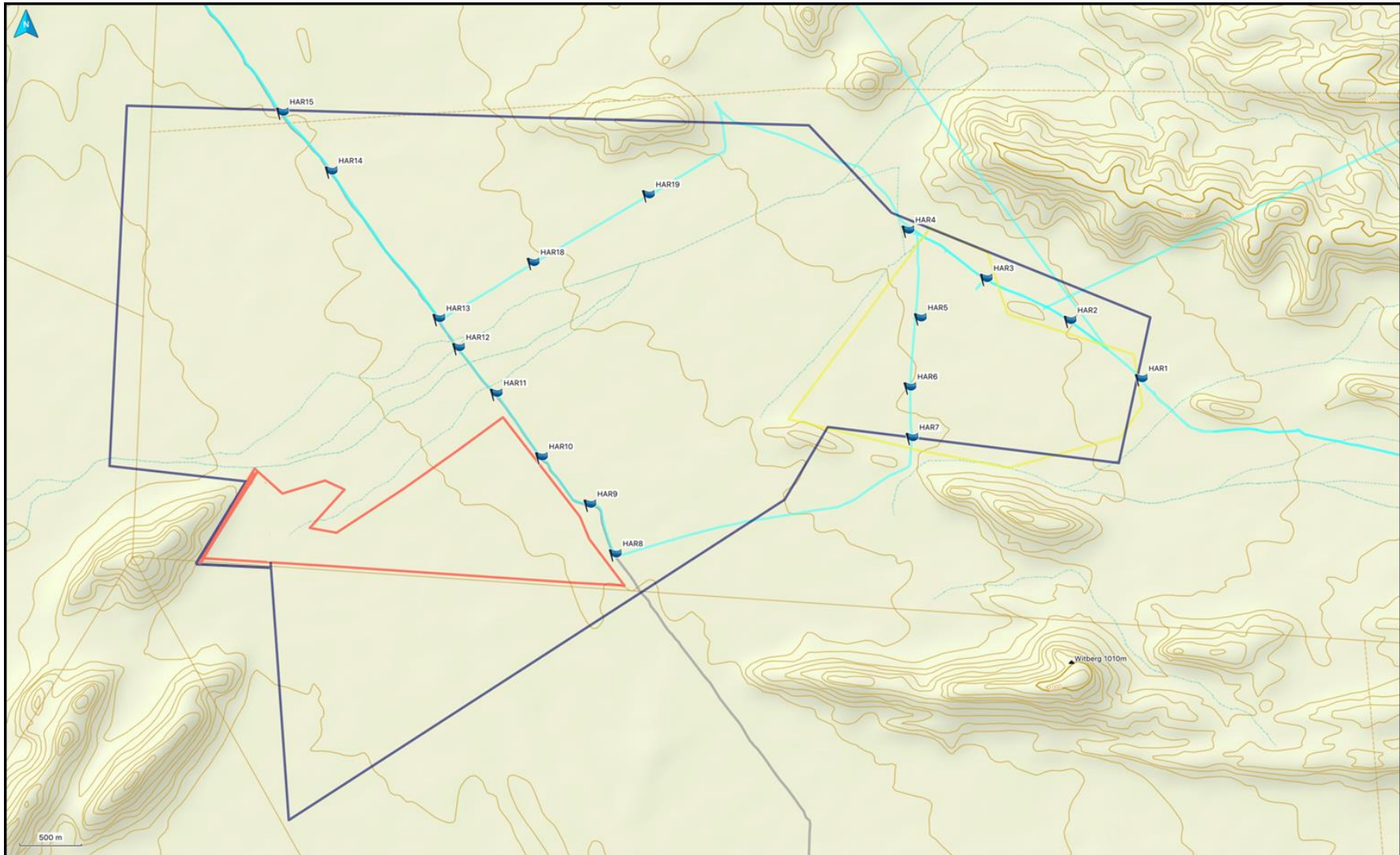


Figure 14. Detailed topography of the greater Veld PV South study area (dark blue boundary) with the Veld PV North 'NEW' shown with a red boundary, approximately 1.8 km west of the Veld PV South (yellow boundary). The sample track is shown as a blue line with sample waypoints at blue flag icons (HAR#).

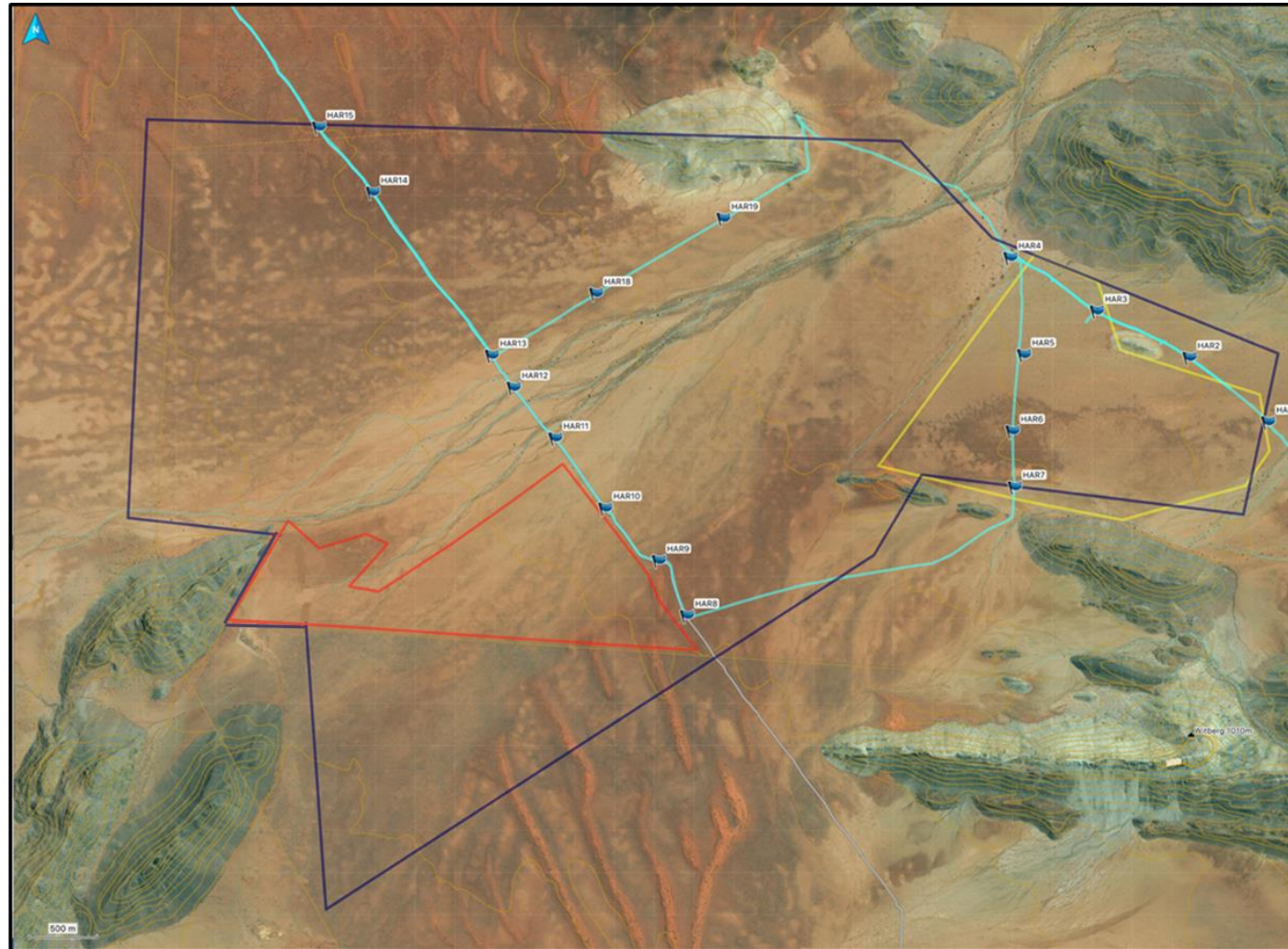


Figure 15. Aerial image (Garmin 'Birdseye' image) showing the greater Veld PV South study area (dark blue boundary) with the Veld PV North 'NEW' shown with a red boundary, approximately 1.8 km west of the Veld PV South (yellow boundary). The sample track is shown as a blue line with sample waypoints at blue flag icons (HAR#).

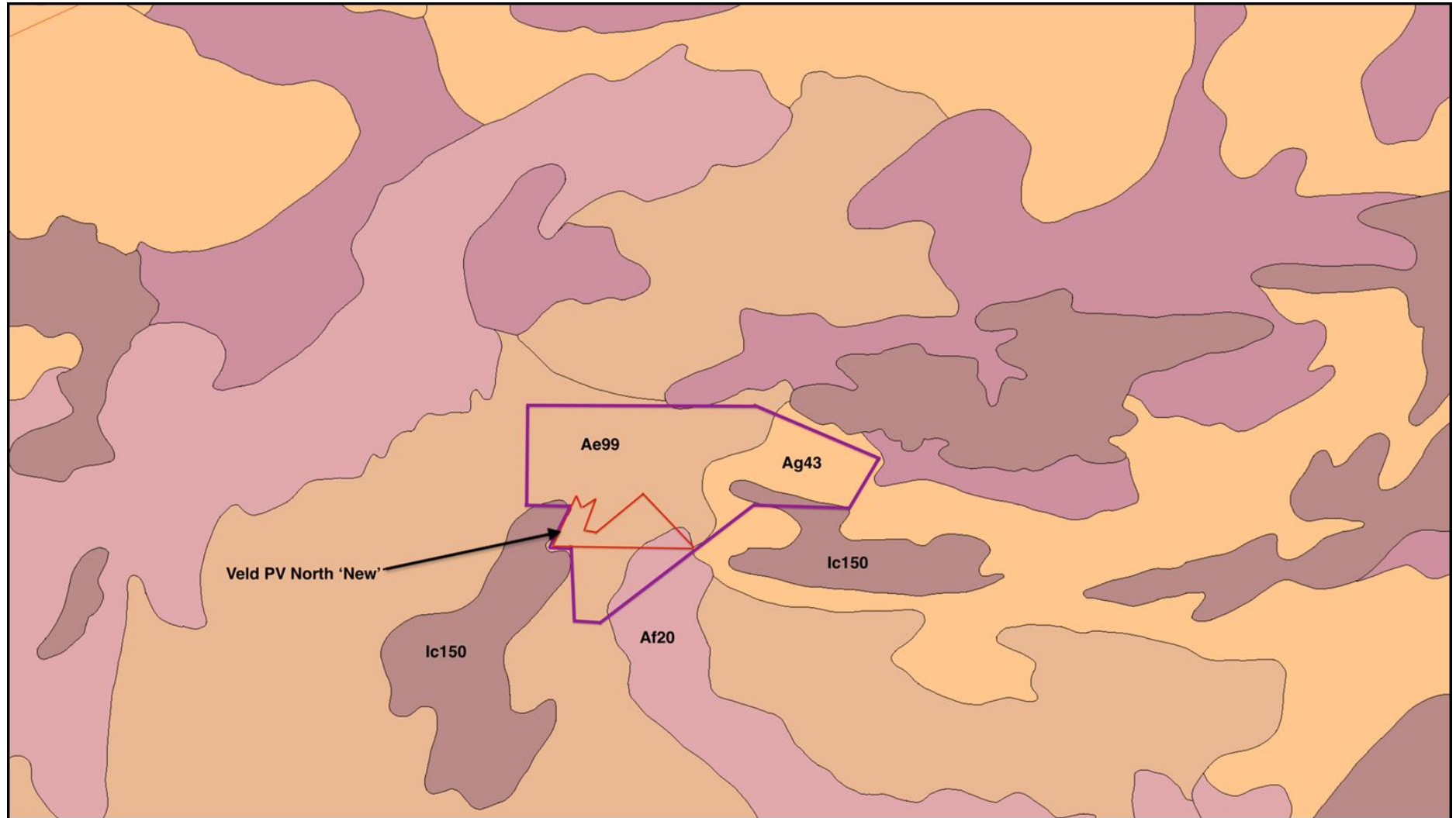


Figure 16. Land type map (Land Survey Staff, 1972—2006) for the Veld PV South general study area on farm Haramoep RE/53 that includes the 'NEW' Veld PV North area.

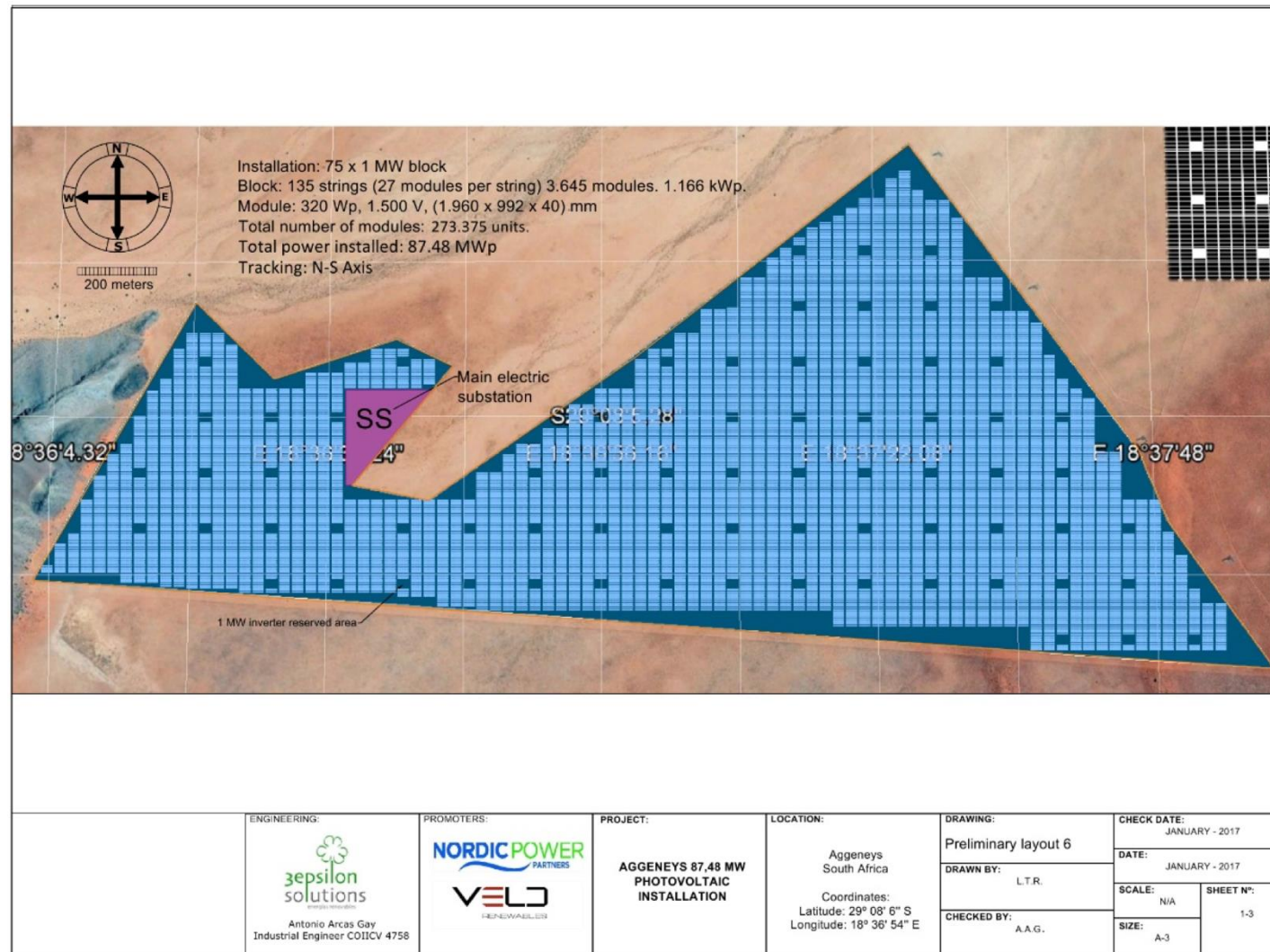


Figure 17. Proposed layout of solar PV in the Veld PV North 'NEW' focus area. This is the preferred alternative

4.3.2 Climate

Bushmanland falls within the summer to autumn rainfall zone of the Northern Cape Province. It experiences highly unpredictable rainfall that can vary between 50 to 200 mm per annum. Rain normally falls as scattered thunder showers when tropical thunderstorm activity extends southwards over the Kalahari. It is not uncommon for a heavy shower to occur in one place and for a nearby area to be completely missed, remaining dry. The pattern of average rainfall for Aggeneys, the closest major town to the study area, shows the typical low annual rainfall values with the highest recorded rainfall in March and April (15 mm) and the lowest of only a few millimetres in the winter months (Figure 18).

Summer daytime temperatures can reach above 40 °C (range 20 – 40+ °C) but average from 26 -- 29 °C for November to March, the hottest months. The dry winters are mild to cold. Winter daytime temperatures can reach 25 °C but at night frost can occur and temperatures can average below 0 °C (-3.3 °C) (Mucina *et al.* 2006) (Figure 20). Two vegetation types are found in the study area as described below. The climate diagram for Bushmanland Arid Grassland (Figure 13) mirrors the climate for Aggeneys as depicted in Figure 19. The upland areas with Bushmanland Inselberg Shrubland have lower rainfall than the plains in the study area but slightly less mean annual potential evaporation. Mean annual temperatures are also marginally lower (Figure 19). The latter vegetation type would not be affected by the proposed renewable energy infrastructure in the Veld PV North 'NEW' focus area.

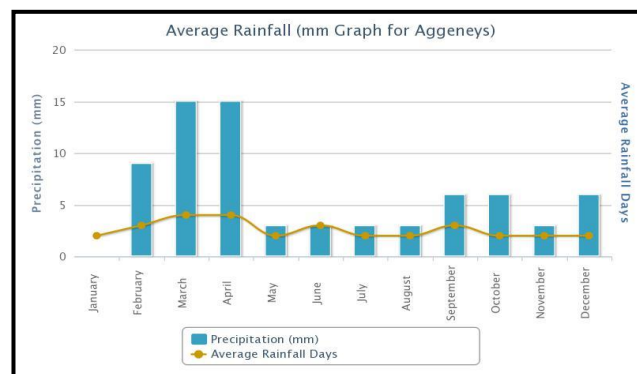


Figure 18. Rainfall for Aggeneys, the main town near to the study area.

(Source: <http://www.worldweatheronline.com/Aggeneys-weather-averages/Northern-Cape/ZA.aspx>)

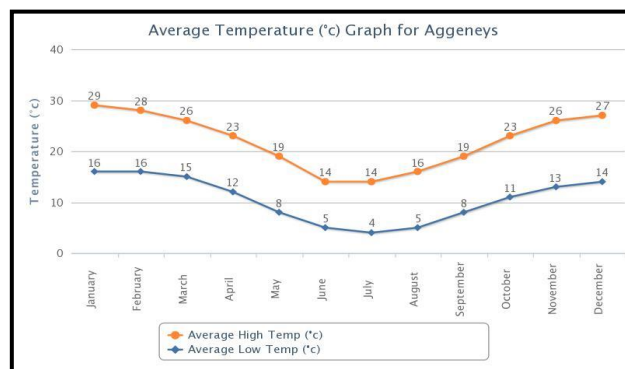
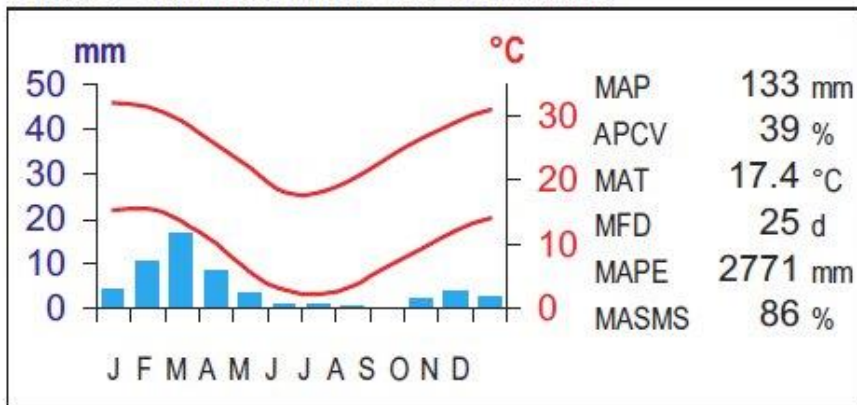


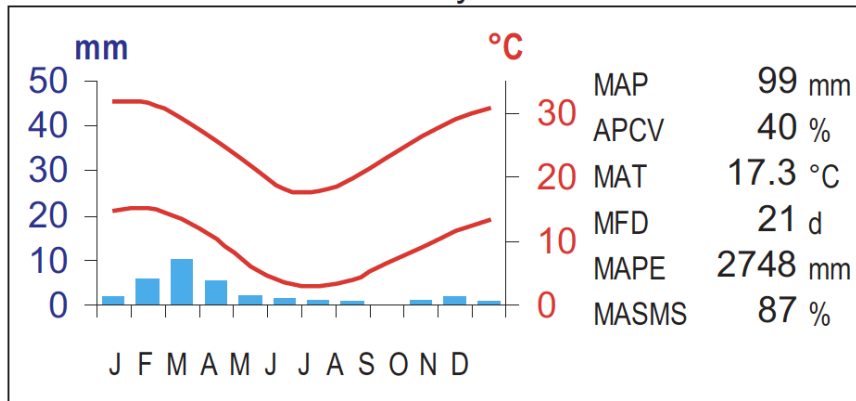
Figure 19. Temperatures for Aggeneys, the main town near the study area.

(Source: <http://www.worldweatheronline.com/Aggeneys-weather-averages/Northern-Cape/ZA.aspx>)

NKb 3 Bushmanland Arid Grassland



NKb 4 Bushmanland Sandy Grassland



SKr 18 Bushmanland Inselberg Shrubland

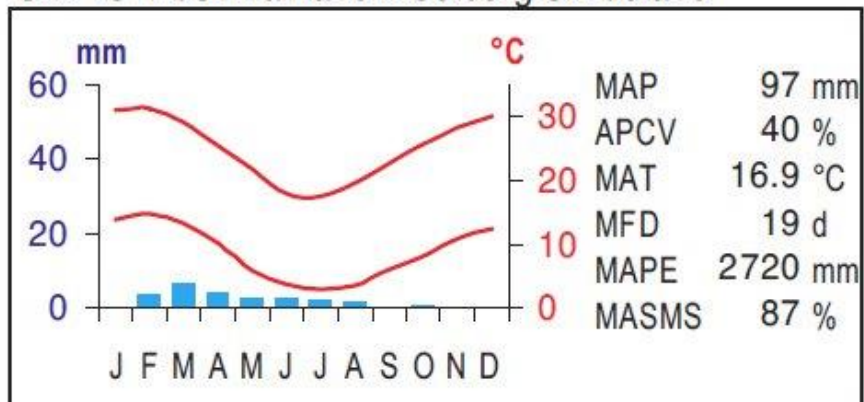


Figure 20. Climate diagrams for Bushmanland Arid Grassland, Bushmanland Sandy Grassland and Bushmanland Inselberg Shrubland (from Mucina *et al.*, 2006) showing MAP – Mean Annual Precipitation; APCV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

5. Methods

5.1 Field Sampling

Field-work for the assessment of the proposed Veld PV North 'original' project was carried out on 15 and 17 November 2016. The Veld PV North 'NEW' area (preferred alternative) was covered on 16 November 2016.

Contact was made with the landowners and permission obtained to enter their properties. They also volunteered valuable insights into the past history of land-use which directly affects the present-day condition of the vegetation. The survey was carried out mostly from a vehicle. Access roads were driven (Figures 9, 14 & 15) and where necessary short on-foot surveys were made to record the species composition of the vegetation and to obtain photographs.

The method used was a 'rapid-assessment technique' in which site observations and numerous photographs were taken for later 'desk-top' analysis. The recorded information was transferred to Google Earth™ aerial-photo maps as well as Garmin Birdseye imagery and used for the preparation of maps.

No formal phytosociological analysis was conducted. The vegetation is described from the species and photographs recorded at the waypoints. The National Vegetation Map (SANBI, 2012) was used as a base map. The Critical Biodiversity Areas map of the Northern Cape Province (E. Oosthuysen) was also used as an informant for interpreting the potential impacts on the vegetation.

5.2 Limitations and Assumptions

The environment was extremely dry at the time of the site visit and no plants were actively growing. This, however, was not entirely a drawback since the greater Veld PV South area that includes the Veld PV North 'NEW' area is largely uniform and a meaningful appraisal could be done using personal knowledge of this type of environment from elsewhere e.g. Namies south-east of Aggeneys, that I visited in more favourable climatic circumstances.

6. Botanical evaluation of the Veld PV North 'NEW' focus area

6.1 General description

Bushmanland Arid Grassland is the main vegetation type found in the Veld PV North 'NEW' 'focus area' area at Haramoep 53/RE. This vegetation type occurs over a wide expanse in the Northern Cape Province from the Bushmanland Basin in the south to the vicinity of the Orange River in the north and from Prieska in the east to Aggeneys in the west (Mucina *et al.* 2006b; McDonald, 2011; McDonald 2012a & 2012b). It is considered to be Least Threatened (Driver *et al.* 2012; Government Gazette, 2011). In the study area, it is found on sandy, well-drained

yellow to red soils. The landscape is prone to sheet-wash at times of heavy rain. Bushmanland Sandy Grassland is described by Mucina *et al.* (2006) as occurring in the surround of Aggeneys and in a few isolated patches near Copperton in the Northern Cape Province. It occurs on red sands >300 mm deep mainly on the Af land-type (in this case Af20).

6.2 Bushmanland Arid Grassland: Open Plains Grassland

The Veld PV North 'NEW' focus area is covered with Open Plains Grassland (a sub-unit of Bushmanland Arid Grassland) – Least Threatened. It is described as semi-desert 'steppe' by Mucina *et al.* (2006b) and is typically dominated by Gha grass (*Centropodia glauca*) and 'white grasses' (*Stipagrostis* spp.) (Figure 21). This vegetation occurs on shallow red sandy soils. Due to the extremely dry conditions prevailing at the time of the site visit, no other plant species apart from the grasses were seen or identified in this vegetation type.



Figure 21. The Veld PV North 'NEW' would be located mostly in Bushmanland Arid Grassland as shown here with the grass *Centropodia glauca* (gha grass) dominant.

6.2 Bushmanland Sandy Grassland

A small area of Veld PV North 'NEW' is found on Bushmanland Sandy Grassland. This vegetation type differs very little from Bushmanland Arid Grassland except that it occurs where sandy dunes are present and where the sand is somewhat more mobile than in Bushmanland Arid Grassland (Figure 22). The vegetation is dominated by 'white' grasses (*Stipagrostis* spp. and *Schmidtia kalahariensis*) as well as drought-resistant shrubs. This vegetation type is Least Threatened.



Figure 22. A view over the Veld PV North 'NEW' area with red dunes supporting Bushmanland Sandy Grassland.

The layout of Veld PV North 'NEW' has been deliberately designed to exclude any drainage lines. This is positive since *Boscia albitrunca* (shepherd' tree or witgatboom) occurs along drainage lines north and immediately west of the focus area (Figure 23). This species is protected under the National Forests Act 1998 (Act 84 of 1998). If, for some reason, any trees of this species must be removed or otherwise affected (e.g. pruned) a permit for such activity would be required from the Department of Agriculture, Forestry and Fisheries.



Figure 23. An example of an old specimen of *Boscia albitrunca* (shepherd's tree; witgatboom)

6.3 Invasive Alien Plants

No alien invasive plant species were found in the Veld PV North focus area but *Prosopis glandulosa* var. *torreyana* (honey mesquite) is found at Farm Haramoep RE/53 (Figure 24). Caution is therefore advised since disturbance due to construction can introduce and spread this species which would be undesirable.



Figure 24. Invasive honey mesquite (*Prosopis glandulosa* var. *torreyana*) along the entrance road to farm Haramoep RE/53.

7. Conservation Status and Vegetation Sensitivity

Desmet & Marsh (2008) mapped the Critical Biodiversity Areas (CBAs) for the Namaqua District Municipality Biodiversity Sector Plan. Their work has subsequently been extended to the entire Northern Cape Province and the shapefile for the relevant map that covers the Veld PV North 'NEW' focus area was obtained (E. Oosthuysen pers. comm.) The map designates the Veld PV North 'focus area' as falling partly within a Critical Biodiversity 1 [CBA1] but mostly in Critical Biodiversity Area 2 [CBA2] (Figure 21). The definition and parameters of CBA 1 and CBA2 according to Desmet & Marsh (2008) are given in Appendix 1. CBA 1 sites are mainly irreplaceable sites with high levels of biodiversity sensitivity. CBA2 includes important areas that have endangered vegetation types, important habitat types and threatened species. From field observations it has been determined that the Veld PV North 'NEW' focus area has none of these attributes. The rationale for assigning this area to CBA1 and CBA2 is not clear and no documentation is currently available that explains this designation. It is my contention, based on observations, that the Veld PV North 'NEW' focus area should be assigned Ecological Support Area (ESA) status which still points to its ecological value but does not assign a 'critical' status to the area.

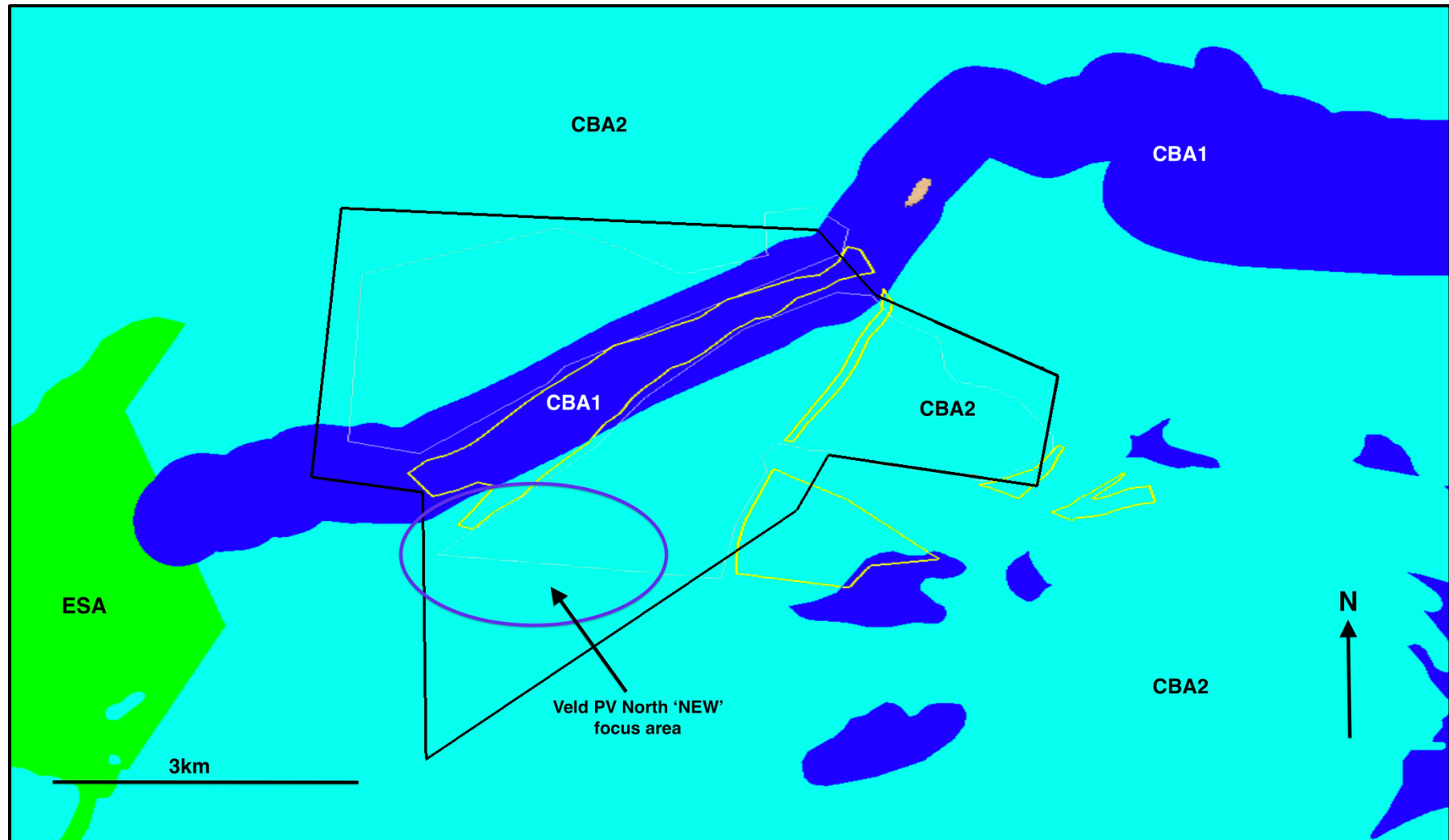


Figure 25. Critical Biodiversity Areas map for the greater Veld PV South study area (black boundary) with the Veld PV North “NEW” [preferred] (purple oval) located marginally in CBA1 but mostly in CBA2.

8. Constraints and Opportunities

The vegetation found in the Veld PV North 'NEW' focus area has very low botanical sensitivity. The Bushmanland Arid Grassland and Bushmanland Sandy Grassland do not display high species richness and very few shrubs were noted. The dominant species are all common grasses and no species of conservation concern (Red List species) were recorded. Despite the classification of the Veld PV North 'NEW' being classified as marginally CBA1 and mostly CBA2, it is my view that, from a botanical perspective, this area is ideal for the construction of a solar PV project.

9. The Final Layout

All references above to the Veld PV North 'NEW' focus area should now be understood as the **PREFERRED ALTERNATIVE for Veld PV North.**

9.1 The VELD PV North Power Block

The VELD PV North Power Block as proposed is as recommended from the scoping phase. It lies in the southern part of the originally investigated VELD PV South general area (Figure 26 and see also Figure 17).

9.2 The Access Roads

The road that will be used for construction will be from the N14 national highway along an existing minor gravel road so no additional negative impact would be imposed during the construction phase or during the operational phase. It would link to local farm roads to give access to both Veld PV South and Veld PV North (Figures 26 & 27). The impact during the construction and operational phases would be **Low Negative**. (No impact assessment table is provided for the access roads.)

9.3 The Veld PV North power-line

The Veld PV North power-line will skirt the northern side of the Veld PV North Power Block and link to the power-line from the Veld PV South Power Block at a common hub sub-station (Figure 27).

9.4 The 132 kV evacuation power-line

The 132 kV evacuation power-line would run south-east from the common hub sub-station across terrain similar to that where the PV blocks would be located, to the Aggeneys Eskom Substation (Figure 27).

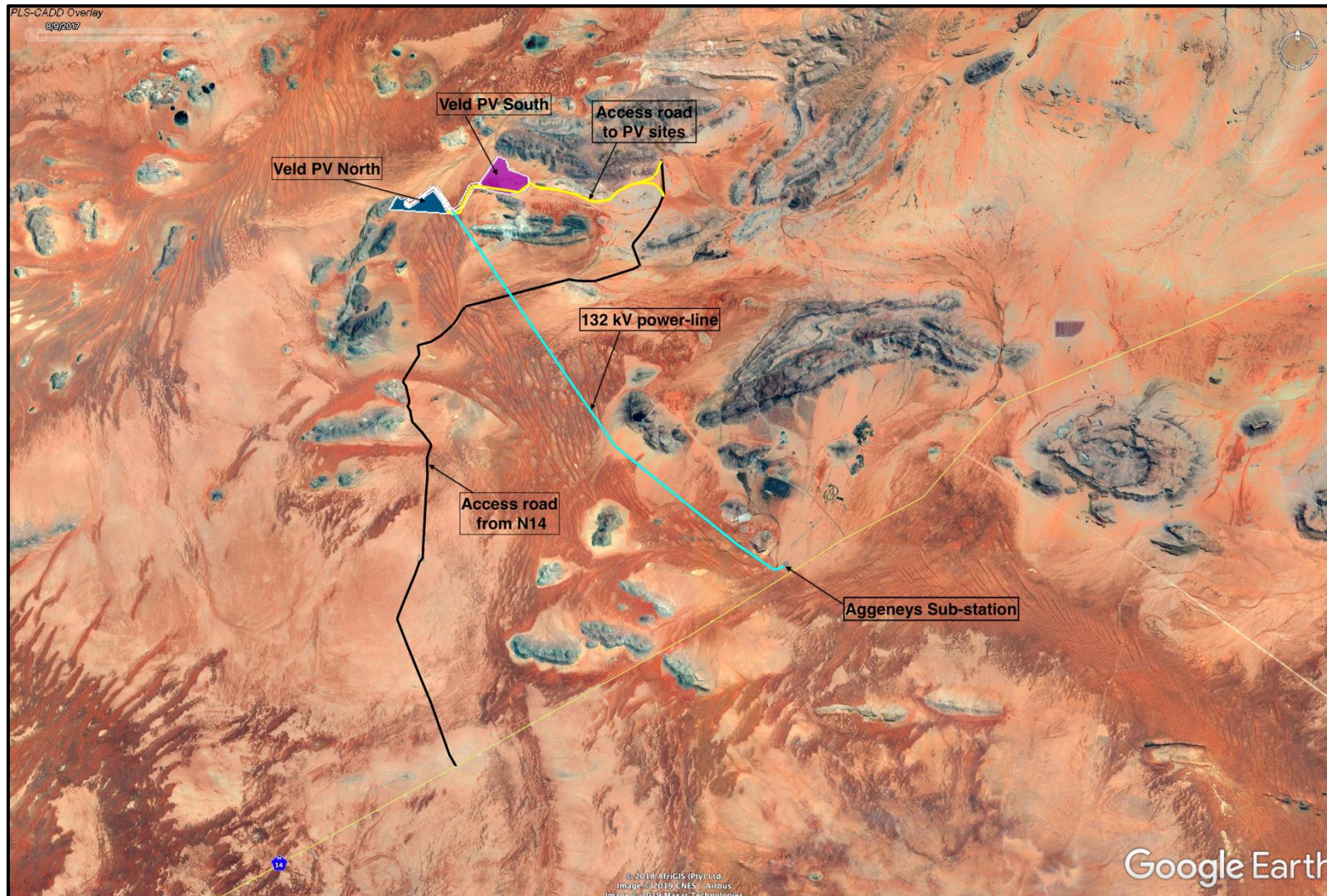


Figure 26. Aerial image (Google Earth™) showing the location of the Veld PV North site, the Veld PV South site access roads and the 132 kv power-line route to Aggeneys Eskom Sub-station.

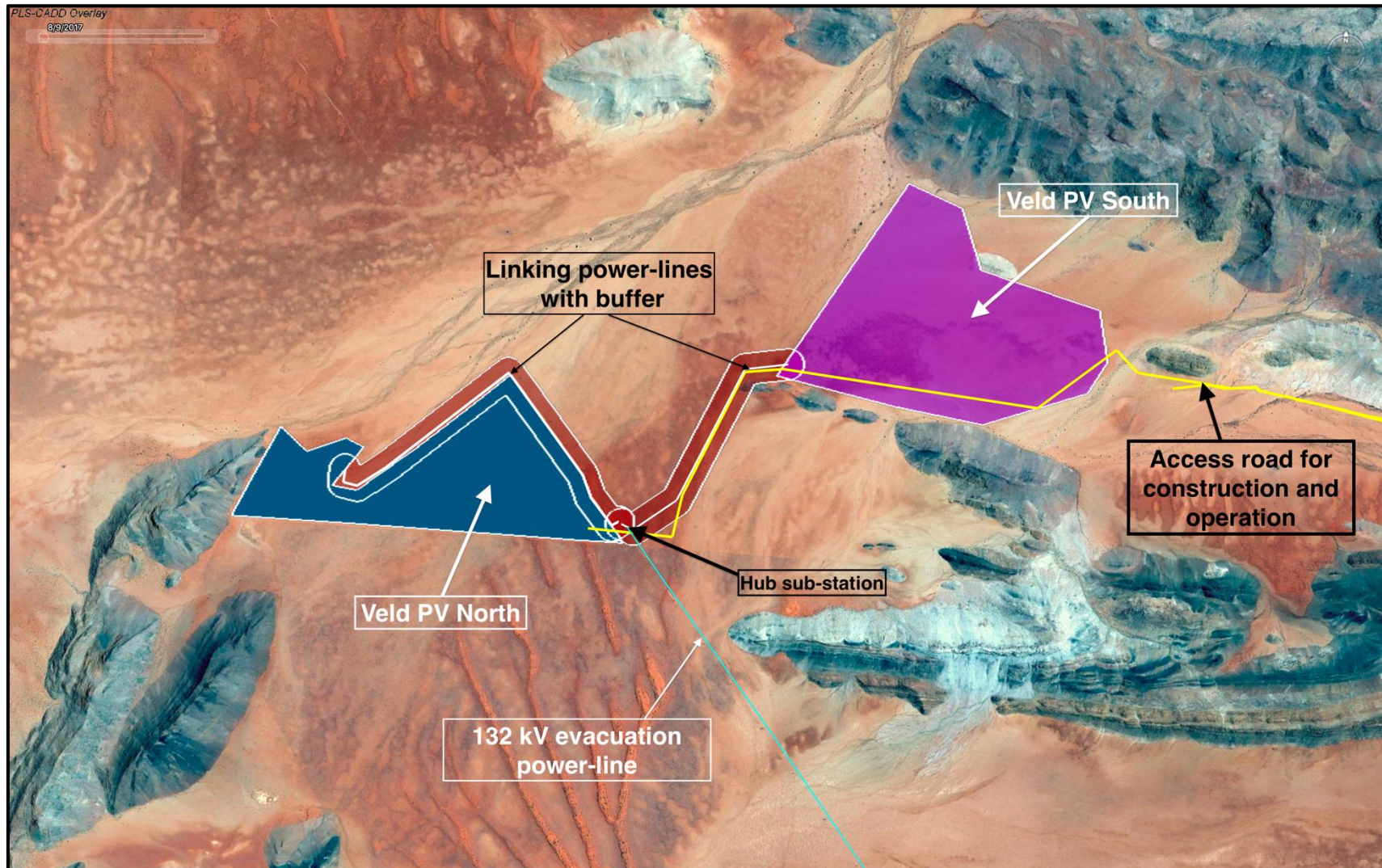


Figure 27. Magnified aerial image (Google Earth™) showing the Veld PV North site (dark blue) with power-line and buffer area (brown) on the north side with the Veld PV South site to the east. The blue line represents the 132 kV evacuation power line that will follow the existing Eskom servitude. Site access roads are shown in yellow.

10. Impact Assessment

The Veld PV North preferred alternative is as proposed in the layout in Figure 17.

10.1 The ‘No Go Alternative

In the case of the ‘No Go’ alternative, the proposed Veld PV North would not be constructed and the *status quo* would persist where current farming practices would continue. The impact of the ‘No Go’ alternative would be **Very Low negative**.

10.2 Direct Impacts of the construction of the Veld PV North Power Block: technology alternatives.

The type of technology used would have little to no bearing on the vegetation since the entire footprint of the site would be disturbed. (This is only assessed for Veld PN North ‘NEW’ (preferred) since Veld PV North ‘original’ has been screened out). The alternative technologies would have more-or-less similar impacts in the Veld PV North ‘NEW’ area i.e. **Low negative** (Table 1), although single axis tracking may have marginally less negative impact.

Table 1. Assessment of impacts of the proposed Veld PV North: Technology alternatives.

TECHNOLOGY ALTERNATIVE	Alternative A1		Alternative A2	
Short description	Fixed axis PV in the area designated as Veld PV North (preferred). In terms of impacts on botanical attributes of the site it is the footprint that is of importance since virtually all vegetation within the footprint would be removed or at least disturbed in some way.		Single axis tracking PV in the area designated as Veld PV South. In terms of impacts on botanical attributes of the site it is the footprint that is of importance since virtually all vegetation within the footprint would be removed or at least disturbed in some way.	
Description of alternative specific attributes	The type of PV technology used would have little bearing on the vegetation found in the Veld PV North ‘NEW’ focus area since the disturbance impacts would be mainly during the construction phase and they would then continue but to a lesser extent in the operational phase.		The type of PV technology used would have little bearing on the vegetation found in the Veld PV North ‘NEW’ focus area since the disturbance impacts would be mainly during the construction phase and they would then continue but to a lesser extent in the operational phase.	
List of negative impacts	N/A	Removal of Bushmanland Arid Grassland vegetation and minimal Bushmanland Sandy Grassland.	N/A	Removal of Bushmanland Arid Grassland vegetation and minimal Bushmanland Sandy Grassland.
List of positive impacts	No positive impacts	N/A	No positive impacts	N/A
List of potential mitigations	N/A	None required	N/A	None required
Assessment				

Nature	Positive	Negative	Positive	Negative
Duration	N/A	Long-term	N/A	Long-term
Extent	N/A	Local	N/A	Local
Magnitude	N/A	Low	N/A	Low
Probability	N/A	High	N/A	High
Confidence	N/A	High	N/A	High
Reversibility	N/A	High	N/A	High
Resource irreplaceability	N/A	Low	N/A	Low
Mitigatability	N/A	Medium	N/A	Medium
Significance	N/A	Low (without mitigation)	N/A	Low (without mitigation)
Conclusion				
Ranked preference (from 1-2)	2		1	
Motivation for preferred alternative	Both technology alternatives would have similar negative impacts on the vegetation of the Veld PV North focus area. The only reason for selecting Alternative 2 above Alternative 1 is that there could be marginally less disturbance of the vegetation. However, the difference in the level of disturbance is difficult to predict.			

10.3 Direct Impacts of the construction of the Veld PV North solar project: Locality alternatives

The direct impact of the PV project in the Veld PV North preferred alternative area would result in removal of mainly grassy vegetation but also a few shrubs. Since the Veld PV North ‘original’ area has been screened out, it has been adopted as one alternative in the assessment with the second (preferred) alternative being the Veld PV North ‘NEW’ focus area. Impact of construction and operation in the Veld PV North ‘original’ area would be **High Negative** (pre- and post-mitigation) whereas in the Veld PV North preferred alternative area the impact would be **Low negative** both pre- and post-mitigation. It is my opinion that the Veld PV North preferred alternative site has very low botanical sensitivity and given other attributes such as its topography I view this as an ideal site for installation of solar PV (Table 2).

Table 2. Assessment of impacts of the proposed Veld PV North: Location alternatives.

LOCATION ALTERNATIVE	Alternative B1	Alternative B2
Short description	North, located on Naroep 45 (original)	South, located on Haramoep RE/53 (new and preferred)
Description of alternative specific attributes (environmental / socioeconomic / Technical and financial)	The Veld PV North ‘original’ site is ecologically complex and botanically sensitive. Protected tree species are found in this area.	The Veld PV North ‘NEW’ site has low levels of biodiversity, is not ecologically complex and has low to very low botanical sensitivity. No plant species of conservation concern are found in this area.
List of negative impacts	Removal of East Gariep Plains Desert and east Gariep Rocky Desert	Removal of Bushmanland Arid Grassland vegetation and minimal Bushmanland Sandy Grassland.
List of positive impacts	None	None

List of potential mitigations	None required	Avoidance of construction due to sensitivity of the area.	None required	None required
Assessment				
Nature	Positive	Negative	Positive	Negative
Duration	N/A	Long-term	N/A	Long-term
Extent	N/A	Local	N/A	Local
Magnitude	N/A	High negative	N/A	Low negative
Probability	N/A	Definite	N/A	Definite
Confidence	N/A	High	N/A	High
Reversibility	N/A	Low	N/A	High
Resource irreplaceability	N/A	High	N/A	Low
Mitigatability	N/A	Low	N/A	High
Significance	N/A	High negative (pre- and post-construction)	N/A	Low negative (pre- and post- mitigation)
Conclusion				
Ranked preference (from 1-4)	2		1	
Motivation for preferred alternative	The Veld PV North 'original' is in a much more sensitive ecosystem than the Veld PV North 'New' (preferred). In addition, there are no protected trees or other species of conservation concern in the Veld PV North (preferred) area.			

10.4 Direct Impacts of the construction of the VELD PV North power-line and buffer

An 'on-site' power-line will extend around the Veld PV North Power Block and would require a buffer zone to ensure that it is safe from impeding activities associated with the PV panels. This buffer zone would not result in the loss of much vegetation since it is in exactly the same habitat as the power block itself. There is only one alternative of this component of the project (Table 3).

Table 3. Assessment of impacts of the proposed Veld PV North: Power-line and buffer.

LOCATION ALTERNATIVE	Preferred alternative	
Short description	The Veld PV North power-line and buffer is located on Haramoep RE/53	
Description of alternative specific attributes (environmental / socioeconomic / Technical and financial)	The Veld PV North site has low levels of biodiversity, is not ecologically complex and has low to very low botanical sensitivity. No plant species of conservation concern are found in this area.	
List of negative impacts	Removal of Bushmanland Arid Grassland vegetation and minimal Bushmanland Sandy Grassland.	
List of positive impacts	None	
List of potential mitigations	None required	None required
Assessment		

Nature	Positive	Negative
Duration	N/A	Long-term
Extent	N/A	Local
Magnitude	N/A	Low negative
Probability	N/A	Definite
Confidence	N/A	High
Reversibility	N/A	High
Resource irreplaceability	N/A	Low
Mitigatability	N/A	High
Significance	N/A	Low negative (pre- and post- mitigation)
Ranked preference (from 1-4)	1	
Motivation for preferred alternative	This site has low to very low botanical sensitivity	

10.5 Direct Impacts of the construction of the 132 kV evacuation power-line to Aggeneys

As shown in Figure 17, the sub-station for the PV blocks would be contained on the site (i.e. on the footprint) of the PV or power blocks. The 132 kV evacuation power line would extend south-eastwards for approximately 24 km from the PV sub-station to the Aggeneys Sub-station. It will traverse gravel plains lowlands the support Bushmanland Arid Grassland and an area of dunes where Bushmanland Sandy Grassland occurs. None of these habitats are regarded as botanically sensitive.

Table 4. Assessment of impacts of the proposed Veld PV North and VELD PV South 132 kV evacuation power line to Aggeneys Sub-station

LOCATION ALTERNATIVE	Preferred Alternative	
Short description	The evacuation power line of 24 km will traverse Bushmanland Sandy Grassland that has low to very low botanical sensitivity	
Description of alternative specific attributes (environmental / socioeconomic / Technical and financial)	The Veld PV North power line will be shared with the Veld PV South to carry 132 kV from the solar PV blocks to the Eskom Aggeneys Sub-station. The power-line route has low levels of biodiversity, is not ecologically complex and has low to very low botanical sensitivity. No plant species of conservation concern are found in this area.	
List of negative impacts	Removal of Bushmanland Arid Grassland vegetation and Bushmanland Sandy Grassland would be minimal.	
List of positive impacts	None	
List of potential mitigations	None required	None required
Assessment		

Nature	Positive	Negative
Duration	N/A	Long-term
Extent	N/A	Local
Magnitude	N/A	Low negative
Probability	N/A	Definite
Confidence	N/A	High
Reversibility	N/A	High
Resource irreplaceability	N/A	Low
Mitigatability	N/A	High
Significance	N/A	Very Low negative (pre- and post-mitigation)
Ranked preference (from 1-4)	1	
Motivation for preferred alternative	This power-line route has low to very low botanical sensitivity.	

10.6 Cumulative impacts

Cumulative impacts from the construction of the Veld PV North Power Block are anticipated to be **Low negative** since Bushmanland Arid Grassland occurs over wide expanses in the Northern Cape Province and is not rich in plant species. Bushmanland Sandy Grassland is also not botanically sensitive. There would be very low irreplaceability of resources due to the construction and operation of the Veld PV North preferred alternative solar project despite other renewable energy projects in similar ecosystems elsewhere.

10.7 Indirect Impacts

No indirect impacts have been identified.

11. Discussion

Two areas were investigated during field-work for the Veld PV North, namely the proposed PV area on farm Naramoep RE/45 (Veld PV North 'original') and the proposed area on farm Haramoep RE/53 further south (Veld PV North 'NEW'). The Veld PV North 'NEW' on Haramoep RE/53 is much more desirable from a botanical perspective since it **avoids sensitive habitat** such as that found in the East Gariep Desert vegetation types at Veld PV North 'original'. The Veld PV North 'NEW' has thus been adopted as the preferred site alternative and is assessed as such here. If the PV project were to be built in the Veld PV North 'original' area on Naramoep RE/45, the impact would be **High negative**.

The wide-open plains where the Veld PV North 'preferred alternative' would be located support Bushmanland Arid Grassland. Where this project would impinge on areas with deeper sand

(dunes) Bushmanland Sandy Grassland would be affected. Both these vegetation types have low botanical sensitivity and the impact of the proposed project would be **Low negative**.

The technology used for the solar farm is immaterial as far as the vegetation is concerned. Conceivably the vegetation of the entire footprint would be disturbed, whether the Alternative 1 (fixed axis PV) or Alternative 2 (single axis tracking PV), is used. Therefore, there would be no meaningful difference in impacts on the vegetation resulting from the different technologies. There may, however, be a small advantage in using single axis tracking PV and that is the reason the technology is preferred above fixed axis PV (Table 1).

12. Conclusions & Recommendations

- Eastern Gariep Rocky Desert and Eastern Gariep Plains Desert vegetation types are found in the Veld PV North 'original' area. Field observations immediately pointed to a complex landscape with sensitive ecosystem containing protected plant species. This led to the selection of an alternative site and the Veld PV North 'NEW' area was chosen as the preferred option. It was recommended that the Veld PV North 'original' site should be AVOIDED.
- Two vegetation types occur in the Veld PV North 'NEW' focus area namely, Bushmanland Arid Grassland and Bushmanland Sandy Grassland These vegetation types are not endangered in any way and are therefore considered to be Least Threatened.
- The vegetation on the Veld PV North 'NEW' has low sensitivity and given that as well as other attributes of the site, the impact on the vegetation and habitat would be **Low negative** (pre- and post-mitigation).
- There is no part of the main Veld PV North preferred site that has any 'red flags'
- No alien invasive plants were recorded in the Veld PV North preferred focus area but exotic mesquite (*Prosopis glandulosa* var. *torreyana*) was noted in the greater Veld PV South study area. Care should be taken during the construction and operational phases to not introduce this invasive species into the PV area.
- All the infrastructure listed in the 'Background and Brief' section was considered in the assessment of impacts. This infrastructure would be contained within the site except for the loop-in, loop out power line and the access roads. The power-line would have negligible further impact than what has been described. Widening of the roads would also result in negligible additional negative impact beyond the impact already in place due to the existing roads.

- The development of the proposed Veld PV North 'NEW' is supported from a botanical perspective. In general, I consider this site to be ideal for the proposed renewable energy infrastructure due to the low negative impact it would have on the vegetation and habitat. On the other hand, the Veld PV North 'original' site is entirely not suitable for a PV project and any construction in that area would not be supported.

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Report submitted: 13 August 2019

Appendix 1: CBA Classification for the Northern Cape Province (from Desmet & Marsh 2008)

Land use category	Biodiversity criteria	Land Management objectives	Recommended appropriate land use ¹
<p>PA: Protected Areas</p>	<ul style="list-style-type: none"> Protected areas (PA's) are recognised entities in the Protected Areas Act and include South African National Parks, Northern Cape Provincial Nature Reserves and Municipal Reserves Conservation areas (CA's) are not recognised in the Protected areas Act (e.g. conservancies, private nature reserves) 	<ul style="list-style-type: none"> Natural landscapes to be managed to maintain in a natural state with limited or no biodiversity loss. 	<ul style="list-style-type: none"> Conservation landscape where biodiversity conservation is a primary management objective Protected Areas: <ul style="list-style-type: none"> PA's to be managed as such with a management plan, a designated management authority, appropriate management resources such as budget and staff Private land preferably to be designated in some way e.g. Stewardship Agreements with audited management plan Livestock: <ul style="list-style-type: none"> Preferably no livestock grazing. Grazing by indigenous ungulates permitted Tourism: <ul style="list-style-type: none"> Suitable for tourism development subject to EIA and provided impact area does not fall into the CBA1 category Other: <ul style="list-style-type: none"> Strictly no mining, agricultural or urban development. Hard development is permitted within protected areas subject to an EIA and impact area does not fall within a CBA1 area. Suitable for scientific research, religious ceremonies, environmental education. Priority areas for restoration and rehabilitation

Land use category	Biodiversity criteria	Land Management objectives	Recommended appropriate land use ¹
<p>CBA 1: Irreplaceable Sites</p> <p>Any area that is irreplaceable in terms of meeting biodiversity pattern targets, i.e. if these areas are not retained in a natural state then conservation targets will not be met.</p> <p>These are core biodiversity areas either with the highest biodiversity value (species richness, endemism, unique habitats, etc.) or areas that have been so transformed to other land-uses (mining and croplands) that all of what remains is required to meet conservation targets</p> <p>The most important areas for biodiversity conservation in the municipality</p>	<p>Terrestrial CBA's:</p> <ul style="list-style-type: none"> • Critical Vegetation Types: Ecosystem Status - Critically Endangered Ecosystems • Critical Terrestrial Habitats: Experts Areas • Irreplaceable Sites: Bokkeveld CAPE Fine-Scale Plan • Critical sites for species <p>Aquatic CBA's:</p> <ul style="list-style-type: none"> • Critical Aquatic Habitats (fine-scale assessment): Bokkeveld critical wetlands and rivers • Critical Aquatic Habitats (fine-scale assessment): Lower Orange River Experts Areas • Critical Aquatic Habitats (fine-scale assessment): Kamiesberg wetland study 	<ul style="list-style-type: none"> • Natural landscapes to be managed to maintain in a natural state with no biodiversity loss. 	<ul style="list-style-type: none"> • Conservation landscape with potentially multiple uses where biodiversity conservation is one of the primary management objectives • Protected Areas: <ul style="list-style-type: none"> • Suitable and a priority for statutory protected area development • Private land preferably to be designated in some way e.g. Stewardship Agreements with audited management plan • Livestock: <ul style="list-style-type: none"> • No permanent livestock grazing. Seasonal grazing permissible • Strictly no kraals, stock posts or artificial water points • Maintain stock within recommended stocking rates • Adopt and implement the Grazing Management Guidelines developed for the NDM • Tourism: <ul style="list-style-type: none"> • No large-scale or intensive tourism development or construction of permanent tourism infrastructure • Suitable for low impact recreation tourism subject to an EIA • Other activities: <ul style="list-style-type: none"> • Strictly no mining, agricultural or urban development • Suitable for scientific research • No biodiversity offsets possible for developments that result in the transformation of natural habitat (e.g. cropping and mining) irrespective of anticipated restoration success.

Land use category	Biodiversity criteria	Land Management objectives	Recommended appropriate land use ¹
<p>CBA 2: Important Areas</p> <p>Other areas know to be of high biodiversity value.</p> <p>Important areas for ecological processes and climate change adaptation.</p>	<p>Terrestrial CBA's:</p> <ul style="list-style-type: none"> • Critical Vegetation Types: Ecosystem Status - Endangered and Vulnerable Ecosystems • Important Terrestrial Habitats: Quartz Patches • Important Terrestrial Habitats: South-facing Slopes • Important Terrestrial Habitats: Kloofs • Important Terrestrial Habitats: Riverine Rabbit • Important Terrestrial Habitats: Experts Areas <p>Aquatic CBA's:</p> <ul style="list-style-type: none"> • Important Aquatic Habitats (fine-scale assessment): Lower Orange River Experts Areas • Important Aquatic Habitats (fine-scale assessment): Kamiesberg wetland study 	<ul style="list-style-type: none"> • To be managed to maintain near natural landscapes with some loss in ecosystem integrity and functioning 	<ul style="list-style-type: none"> • Priority areas restoration and rehabilitation • Multi-use landscapes where biodiversity conservation is a preferred but not the only land use activity • Biodiversity compatible land uses strongly encouraged and industries encouraged to adopt and implement industry accepted biodiversity management plans • Protected Areas: <ul style="list-style-type: none"> • Suitable and a priority for statutory protected area development • Private land preferably to be designated in some way e.g. Stewardship Agreements with audited management plan • Livestock: <ul style="list-style-type: none"> • Stock farming permissible • Adopt and implement the Grazing Management Guidelines developed for the NDM • Tourism: <ul style="list-style-type: none"> • No large-scale or intensive tourism development or construction of permanent tourism infrastructure • Suitable for low impact recreation tourism and construction of temporary infrastructure subject to an EIA • Other: <ul style="list-style-type: none"> • Suitable for scientific research, religious ceremonies, environmental education. • Restrict further expansion of surface-mining, cropping agricultural and urban development – i.e. avoid further loss of natural habitat and where possible utilise

Land use category	Biodiversity criteria	Land Management objectives	Recommended appropriate land use ¹
			existing transformed or degraded areas for hard developments <ul style="list-style-type: none"> • Biodiversity offsets required where development impacts on land management objective
<p>ESA: Ecological Support Areas (Processes)</p> <p>Areas meeting ecological process targets or achieving biodiversity persistence objectives.</p> <p>Areas not explicitly targeted for biodiversity pattern or process, but that support key resources (e.g. water) or features in the landscape whose basic structure and ecological function require protection such as large areas with no permanent human structures (roads housing etc), away from stock posts for maintaining large-scale ecological processes such as free-ranging wildlife</p>	<ul style="list-style-type: none"> • Biodiversity Corridors • Richtersveld springs • Kamiesberg wetland buffer areas • Bokkeveld critical wetland and river buffers • Wilderness areas (not included) 	<ul style="list-style-type: none"> • To be managed to maintain near natural landscapes with minimal loss in ecosystem integrity and functioning • Spatially explicit corridors must be managed to maintain function and structure, especially for aquatic systems. • To be managed to maintain near natural landscapes with minimal loss in ecosystem integrity and functioning • Buffers to be managed to limit transformation with particular emphasis on maintaining ecological process that require large areas. 	<ul style="list-style-type: none"> • Multi-use landscapes where land-use management focuses on maintaining connectivity within the natural landscape • Biodiversity compatible land uses strongly encouraged and industries encouraged to adopt and implement industry accepted biodiversity management plans • Protected Areas: <ul style="list-style-type: none"> • Priority areas for the promotion of stewardship • Livestock: <ul style="list-style-type: none"> • Stock farming permissible • Adopt and implement the Grazing Management Guidelines developed for the NDM • Tourism: <ul style="list-style-type: none"> • Suitable for tourism development • Other: <ul style="list-style-type: none"> • Suitable for scientific research, religious ceremonies, environmental education. • Where possible restrict further expansion of surface-mining, cropping agricultural and urban development – i.e. avoid further loss of natural habitat and where possible utilise existing transformed or degraded areas for hard developments. • Biodiversity offsets required where development impacts on land management objective

Land use category	Biodiversity criteria	Land Management objectives	Recommended appropriate land use ¹
<p>ONA: Other Natural Areas All remaining natural areas containing Vulnerable and Least Threatened Vegetation</p>	<ul style="list-style-type: none"> All remaining natural vegetation 	<ul style="list-style-type: none"> Functional landscapes: manage land to maintain basic ecosystem processes despite expecting significant loss in natural vegetation cover Biodiversity maintained in critical patches and ecosystem corridors Management guidelines are dependent on specific features such as vegetation type status and special species or habitats. These are often protected by specific legislation such as that relating to the maintenance of riparian buffers. 	<ul style="list-style-type: none"> Production landscapes where land-use management focuses on maintaining connectivity within the natural landscape Biodiversity compatible land uses strongly encouraged and industries encouraged to adopt and implement industry accepted biodiversity management plans Livestock production should adopt and implement “Grazing Guidelines” developed for the NDM Development of extensive tourism facilities (e.g. visitor’s centre’s, villages) Transformation by mining, agricultural or urban development conditionally allowed subject to EIA Developments do not necessarily require biodiversity offsets

Appendix 2: Curriculum Vitae

Dr David Jury McDonald Pr.Sci.Nat.

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

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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
- Thirteen 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

Appendix 3: 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)	(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 2
1 (1) (b)	A declaration that the specialist is independent in a form as may be specified by the competent authority.	Pages 3 & 4
1 (1) (c)	An indication of the scope of, and purpose for which, the report is prepared.	Pages 6 & 7
1 (1)(cA)	An indication of the quality and age of base data used for the specialist report.	Page 24
1 (1)(cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Page 11, 27
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 24
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 24
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 29--36
1 (1) (g)	An identification of any areas to be avoided, including buffers.	N/A

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
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 8, 9, 10, 13—16, 18—20,21,25 30 & 31
1 (1) (i)	A description of any assumptions made and any uncertainties or gaps in knowledge.	N/A
1 (1) (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	Page 8, 11, 17, 25, 27
1 (1) (k)	Any mitigation measures for inclusion in the EMPr.	N/A
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 (iA) regarding the acceptability of the proposed activity or activities; and	Page 38
	(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	N/A

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	N/A