Appendix G: Specialist Report(s)
Appendix G.2: Agricultural Compliance Statement

SPIER
Proposed Agrivoltaic Facility

Site Sensitivity Verification & Agricultural Compliance Statement

FINAL DRAFT
October 2024

Report compiled for
GROENBERGENVIRO

AGRI informatics
NATURAL RESOURCE SPECIALISTS

Site Sensitivity Verification and **Agricultural Compliance Statement** for the proposed **Spier Agrivoltaic Facility** in the Western Cape of South Africa.

Report prepared by: **Agri Informatics**
Francois Knight M.Sc.Agric. (Soil Science)
Soil Scientist / Land Capability Specialist

Date submitted: **23 October 2024**

Indemnity
The information contained in this report and the digital data provided, were compiled using the best available information, knowledge, technology and experience. Great effort was made to ensure the highest levels of accuracy possible. However, Agri Informatics Development Trust or any individual or any other company who have contributed towards the compilation of this information cannot be held responsible for any loss or damage incurred as a direct or indirect result of the use thereof. All recommendations were made in good will, but the risks associated with the implementation thereof, resides with the implementor.

Qualifications and Experience of the Specialist

This report was compiled by François H Knight, principal consultant at Agri Informatics. Mr. Knight holds a B.Sc.Agric.Hons degree in Soil Science from the Free State University, a post graduate diploma in Terrain Evaluation from Potchefstroom University and a M.Sc.Agric. *cum laude* degree in Soil Science from the University of Stellenbosch. He has more than 35 years' experience in natural agricultural resource assessments, which stems from his work as a senior researcher at the Department of Agriculture and, for the past 23 years, as an independent consultant.

Mr. Knight is the author or co-author of fifteen scientific papers, congress papers or academic reports. A *curriculum vitae* of Mr. Knight is attached in the Appendix.

Declaration of the Specialist

I, François H Knight, as the appointed Specialist hereby declare/affirm that:

- I act as the independent specialist in this application
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

______________________________ **23 October 2024**

Francois Knight M.Sc.Agric. (Soil Science) Date

This report was prepared according to the assessment protocol and minimum report content requirements for a Site Sensitivity Verification and an Agricultural Compliance Statement (as per Government Notice 320 published in the Government Gazette 43110, dated 20 March 2020). The following Table presents a cross reference to the prescribed reporting protocol.

Site Sensitivity Verification

Requirement	Report Reference
Map of Development Footprint on Agricultural Sensitivity Map from Screening Tool	Figure 4
Results of Desktop Assessment	Para. 4.1
Results of Site Visit	Para. 4.2
Confirm or dispute the current land use and sensitivity as identified by the Screening Tool	Para. 4.3

Agricultural Compliance Statement

Requirement	Report Reference
Provide a map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool.	Para. 5.1
Confirmation that the development footprint is in line with the allowable development limits contained in Table 1 of the Protocol.	Para. 5.2
Confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimize fragmentation and disturbance of agricultural activities.	Para. 5.3
A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development.	Para. 5.4.1
Any conditions to which this statement is subjected.	Para. 5.4.2
Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr).	Para. 5.4.3
A description of the assumptions made and any uncertainties or gaps in knowledge or data.	Para. 5.5

Contents

1 Introduction

The Applicant, **Spier Resort Management (Pty) Ltd** is proposing the establishment of the Spier Agrivoltaic Solar-PV Energy Facility (SEF) and associated infrastructure with a total generation capacity of up to 8.8 MW in two phases, located southwest of Stellenbosch in the Western Cape Province.

The project will occupy ±15 ha of land of Portion 10 of Farm 502, Stellenbosch RD. The farm of 361 ha is currently used for wine grape production (±20 ha) and free-range grazing for chicken, cattle and pigs (±120 ha). The remaining land is mostly uncultivated or old vineyards where production was discontinued more than 20 years ago. The solar facility will be situated on land that has not been cultivated in the past 30 years.

This document reports on the findings of an Agricultural Scoping Assessment as part of the Basic Assessment process for the application of Environmental Authorisation for the proposed facility. It also aims to inform other commenting and deciding authorities in terms of SALA (Act 70 of 1970) and CARA (Act 43 of 1983).

2 Terms of Reference

Agri Informatics was contracted by **GroenbergEnviro** on behalf of the applicant, to conduct an Agricultural Compliance Statement for the land identified for the proposed development.

The assessment had to comply with the assessment and reporting requirements for an Agricultural Compliance Statement, as per Government Notice 320, dated 20 March 2020, which also specifies a Site Sensitivity Verification.

3 The Study Area

3.1 Locality

The study area is situated about 5 km southwest of Stellenbosch town center in the Cape Winelands District Municipality in the Western Cape (Figure 1). It is adjacent to the Stellenbosch Aerodrome and the De Zalze Winelands Golf Estate. The affected property is part of Spier Farms.

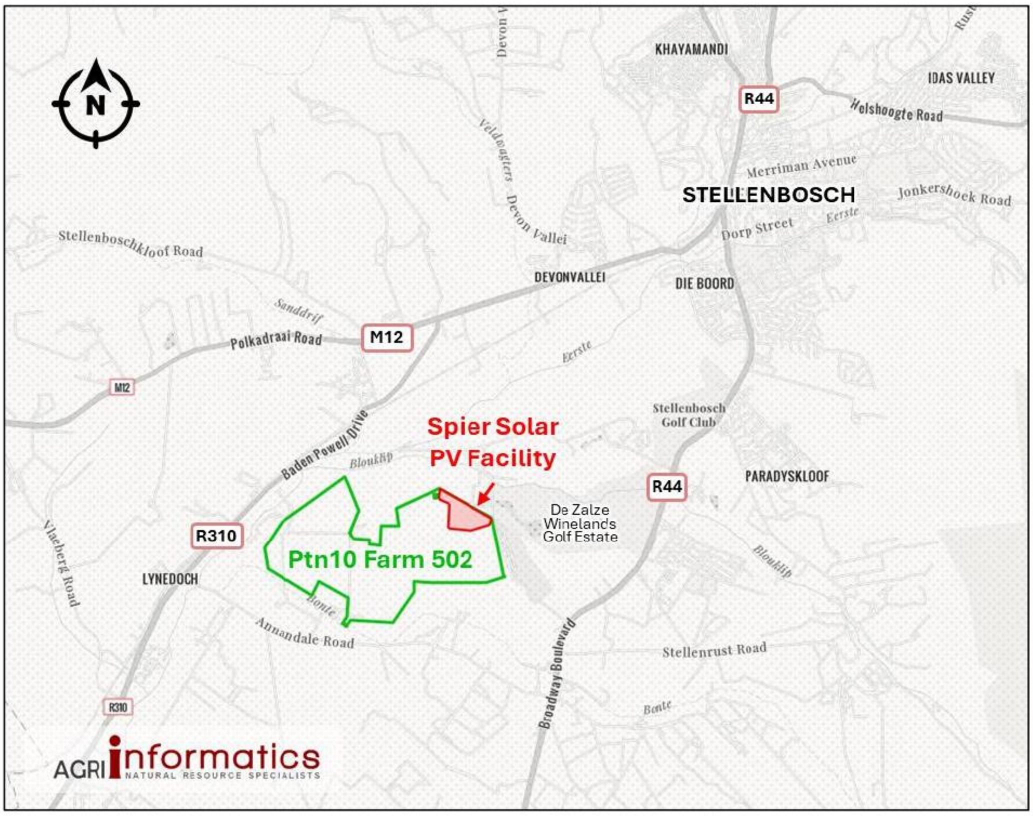


Figure 1: Locality of the study area (red lines) is situated 6 km southwest of Stellenbosch town center.

3.2 Land Portions

The core study area is a 20 ha precinct within a single farm portion of 365 ha (Portion 10 of Farm 502, Stellenbosch RD). The landowner also owns another six farm portions abutting this property, but this study detail is listed in Table 1.

Table 1: Cadastral units (properties) affected by the proposed development.

ID	Property Description	SG Regional Division	Property Ownership	Title Deed	Extent (ha)
1	Portion 10 of Farm 502	Stellenbosch	Spier Farm Management Pty Ltd	T55654/2009	365.0017
Total area of affected land portion included in application					**365.0017**
2	*Portion 6 of Farm 491*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T102524/1999*	*41.95*
3	*Portion 3 of Farm 502*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T102526/1999*	*2.38*
4	*Portion 7 of Farm 502*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T55654/2009*	*10.10*
5	*Rem of Farm 1404*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T102528/1999*	*101.83*
6	*Rem of Farm 1475*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T22982/2006*	*12.30*
7	*Rem of Farm 1530*	*Stellenbosch*	*Spier Farm Management Pty Ltd*	*T69342/2010*	*11.85*
Total area of land owned by Spier Farm Management					***545.41***

3.3 Development Footprint

The exact development footprint is still to be confirmed. The final design is subject to the findings of the various specialist studies to be conducted as part of the Environmental Assessment of which this study is a part. However, the envelope wherein the facility will be placed has been demarcated on a low gradient north facing slope in the far northeastern corner of the farm (Figure 2), abutting the Stellenbosch Aerodrome and the De Zalze Winelands Golf Estate.

Figure 2: Proposed development envelope of the Spier agrivoltaic solar PV facility.

4 Site Sensitivity Verification

The web-based Environmental Screening Tool of the Department of Forestry, Fisheries and Environment (DFFE), indicates the entire area within the development envelope as “Medium agricultural sensitivity” while other parts of the Spier property have High or Very High sensitivity (Figure 4).

The areas of High and Very High sensitivity correlate with areas of more intensive cultivated activities, including wine grapes and irrigated pastures, while the medium sensitivity areas are mostly uncultivated land that can be used for grazing or forms part of demarcated conservation areas on the farm.

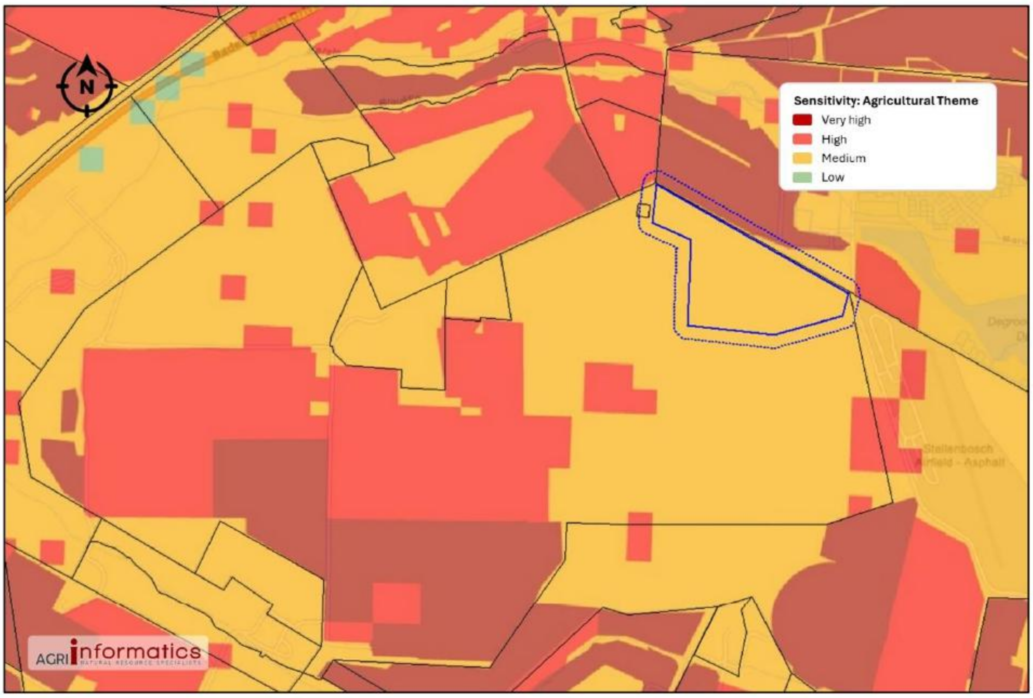


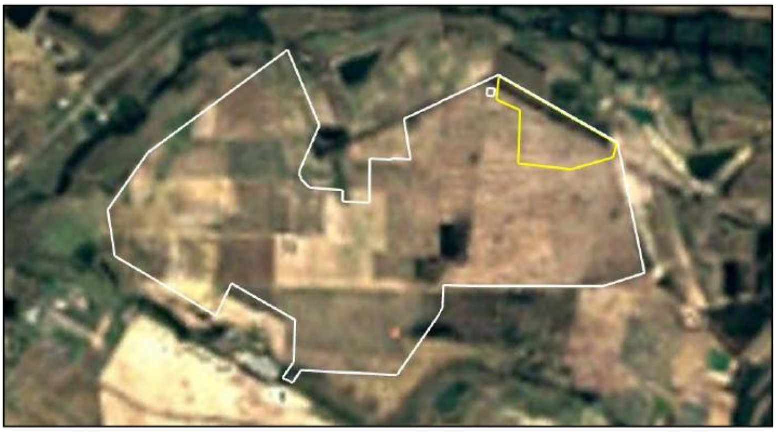
Figure 3: Agricultural Sensitivity as indicated by the Screening Tool of DFFE. The blue dotted line indicates a 50 m-buffer around the development envelope.

4.1 Desktop Assessment

4.1.1 Satellite Imagery

Historic and recent satellite imagery was used to conduct a "desktop reconnaissance" of the study area, with specific focus of the area identified for the solar facility.

Older (1985) low resolution Landsat imagery (below) suggest that the land could have been cultivated earlier, but a time series of satellite images over a period of almost 20 years from 2005 to 2024 (Figure 4) confirms the absence of any cultivation on the development site over the past 2 decades.



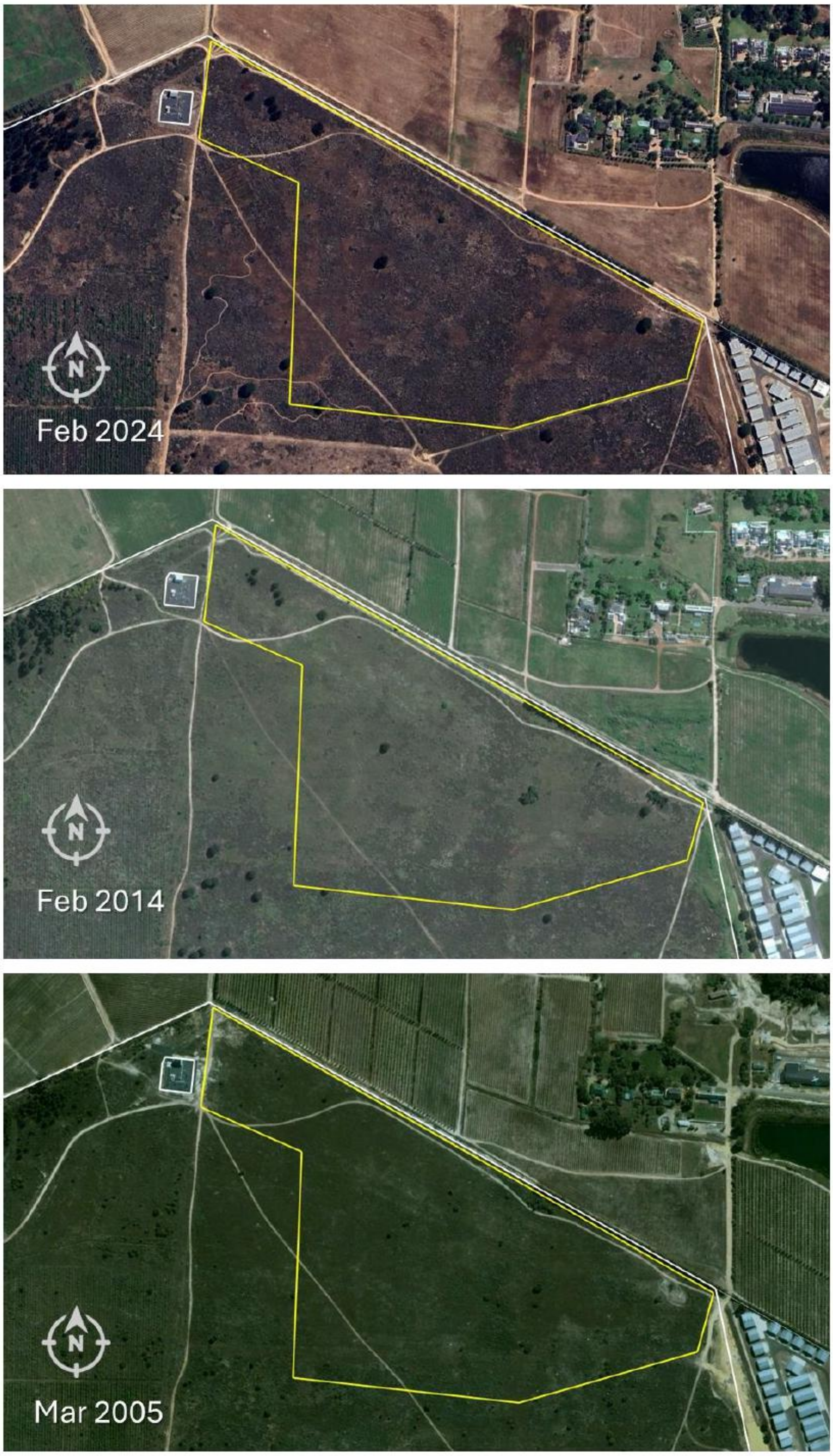


Figure 4: Satellite imagery of the past 20 years confirms the absence of cultivation within the development envelope (yellow line) of the proposed solar facility.

4.1.2 Terrain and Hydrology

The elevation of the proposed development area varies between 92 m amsl in the south to 70 m amsl in the northwestern corner. The terrain is gently sloping towards the north (northwest to northeast) at a slope gradient of generally less than 6% from south to north.

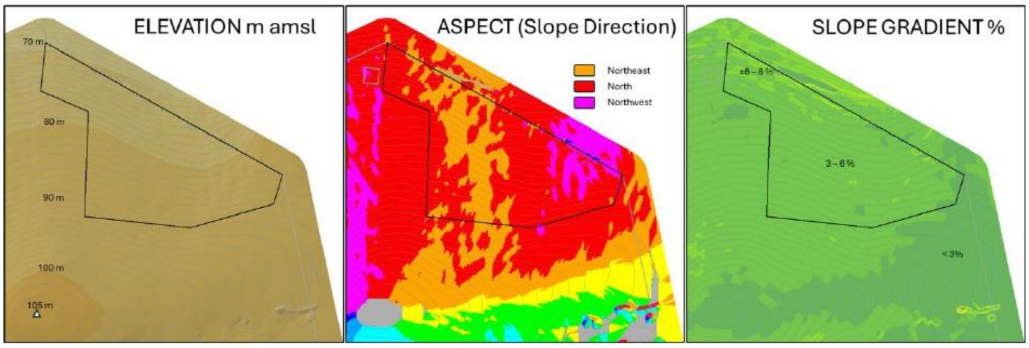


Figure 5: Elevation, aspect and slope gradients of the solar development area.

No streamlines were observed in the study area, but surface runoff will occur flowing from south to north with some accumulation that can be expected along the northern boundary with the neighbouring De Zalze Vineyard and Golf Estate. The existing vegetation will impede surface flow and largely eliminate the risk of soil erosion.

4.1.3 Agro-Climatology

Köppen Geiger

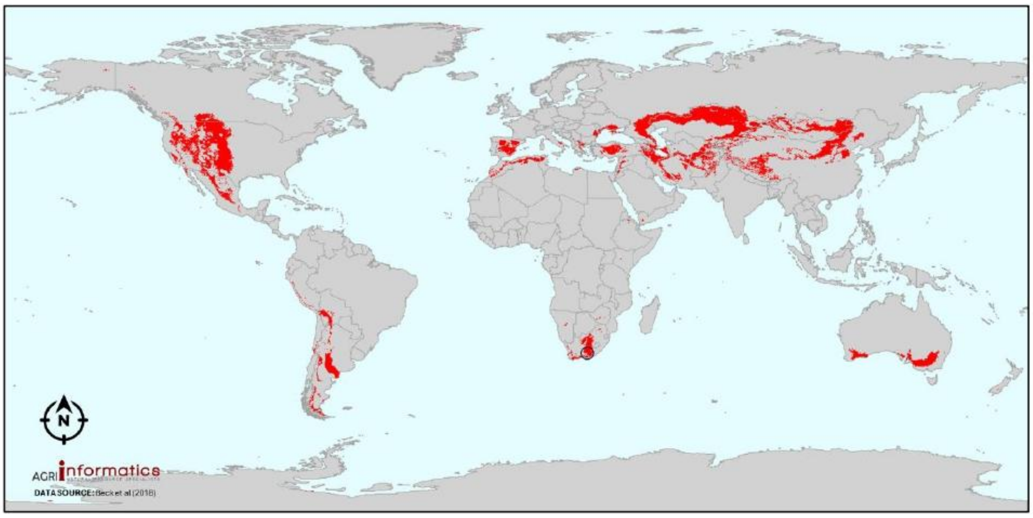


Figure 6: Köppen-Geiger Csb climate zones of the world (Data source: Beck, et al, 2018).

The study area has a Köppen-Geiger climate classification of Csb – a temperate, dry warm summer Mediterranean climate. The average temperature of the coldest month is above 0°C, all months have an average temperature below 22°C and at least four months have an average temperature above 10°C. This region receives at least three times as much precipitation in the wettest month of winter as in the driest month of summer and the driest summer month receives less than 30 mm of rain.

Climate parameters

Table 2: Summary of key climate parameters of the study area (2001-2021) (NASA POWER Climatologies).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rel. Humidity %	66	66	68	71	77	80	82	83	81	77	72	67	**74**
Wind Direction °	163	161	161	174	264	293	286	293	223	178	167	170	**176**
Wind Speed Max m/s	12.0	9.7	10.4	13.3	11.8	13.7	11.9	11.9	10.9	11.0	11.2	11.2	**13.7**
Wind Speed Min m/s	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	**0.0**
Wind Speed Ave m/s	4.4	4.1	3.7	3.3	3.1	3.2	3.1	3.3	3.3	3.6	4.0	4.2	**3.6**
Rainfall mm	20	21	26	54	105	110	101	101	59	37	24	30	**687**
Mean Temp. °C	21.4	21.6	20.1	17.6	15.1	12.6	11.9	12.0	13.4	15.6	17.5	19.9	**16.5**
Ave. Max.T °C	31.8	32.1	31.0	28.5	24.3	20.7	20.0	20.1	22.8	25.8	27.8	29.9	**26.2**
Ave. Min.T °C	10.9	11.1	9.1	6.8	5.9	4.5	3.8	3.9	4.0	5.4	7.2	9.9	**6.9**
Highest Max. T. °C	36.6	38.7	37.8	36.2	29.0	26.3	24.4	26.0	29.8	32.7	33.2	36.3	**38.7**
Lowest Min. T. °C	11.4	11.6	10.4	8.2	6.1	4.9	3.8	4.3	5.5	5.6	8.4	10.2	**3.9**
Frost Days / month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
PAR MJ/m^2/day	13.5	12.2	9.8	7.1	4.9	4.1	4.6	5.8	7.9	10.5	12.5	13.6	**8.9**
ET_0 mm/month	245	215	178	113	72	53	59	73	101	157	205	236	**1707**
Rainfall & Evaporation extracted from Welgevallen weather station													

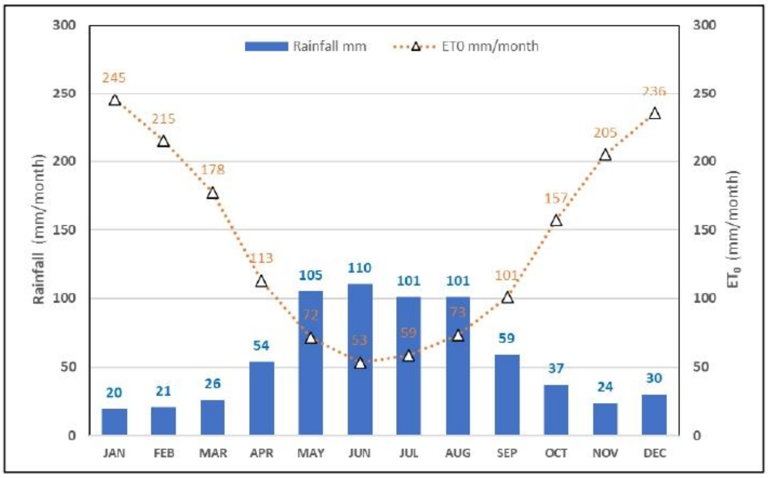


Figure 7: Relationship between monthly rainfall and ET_0.

At an elevation of approximately 230 m amsl and <15 km from the False Bay coastline the climate is marginally maritime, i.e. mean temperature difference between hottest and coldest month is <10°C, at 8.1°C. The average annual rainfall is 687 mm, of which 531 mm (77%) is winter rain between April to September. The warmest months are December to April when maximum temperatures can reach >35.0°C. The coldest month is July with an average mean temperature of 11.9°C and coldest recorded temperature of 3.8°C. The site is considered to be frost free. The mean annual wind speed is 3.6 m/s (NASA Power, 2022).

The positive chill units, calculated by the Linsey-Noakes model (10°C base temperature)is moderate high at 700 degree-hours (Schulze, 2009).

4.1.4 Soils Information

The entire study area is situated within a single Land Types (Ca28).

Table 3: Land Type and corresponding geology, as per the Land Type Memoirs (ARC: ISCW).

Land Type	Geology
Ca28	Mainly granite and deposits of the weathering products of granite of the Kuils River-Helderberg Pluton, Cape Granite Suite; occasional Quaternary quartz sand of the Springfontyn Formation and alluvium.

The broad soil description refers to soils with a plinthic catena: undifferentiated, upland duplex and/or margalitic soils common.

The dominant soil types of this Land Type are shallow (300 – 450 mm) duplex soils of the Kroonstad soil form, or medium deep (400 – 900 mm) of the Longlands or Avalon soil forms. The clay content of the top-soils are less than 6%, while the clay content of the sub-soil is clayey (>25%) in the duplex soils.

Table 4: An extract of the various soil forms associated with the different terrain units of Land Type Ca28.

Soils per Terrain Unit (% of Land Type)											
1 (10%)			3 (35)			4 (40%)			5 (15%)		
Soil Form	%	Depth	Soil Form	%	Depth	Soil Form	%	Depth	Soil Form	%	Depth
Kd/Wa	5	300-450	Kd/Wa	45	300-450	Kd/Wa	41	300-450	Kd/Wa	10	300-450
Gs	40	250-350	Lo	5	400-800	Lo	17	400-800	Lo	20	400-800
Cv/Hu	5	800-1200	Gs	10	250-350	Gs	3	250-350	We	40	300-600
Sw	5	300-450	Av	5	500-900	Av	17	500-900	Du/Oa	30	500-1200
Hu	25	800-1200	Cv/Hu	10	800-1200	Cv/Hu	11	800-1200			
Hu	20	150-350	Sw	10	300-450	Sw	7	300-450			
			Hu	5	800-1200	We	1	300-600			
			Hu	5	150-350	Pn	4	400-800			
			Pn	5	400-800						
DOMINANT SOIL FORM (41% of Foot Slopes)						SUB-DOMINANT SOIL FORMS (34% of Foot Slopes)					
The study area falls completely within Terrain Unit 4											

A soil survey of the Spier farm was conducted *circa* 2008 as part of the planning and optimization program of the farm, to guide existing and future cultivation. The following soil map of the solar development area was extracted from this data.

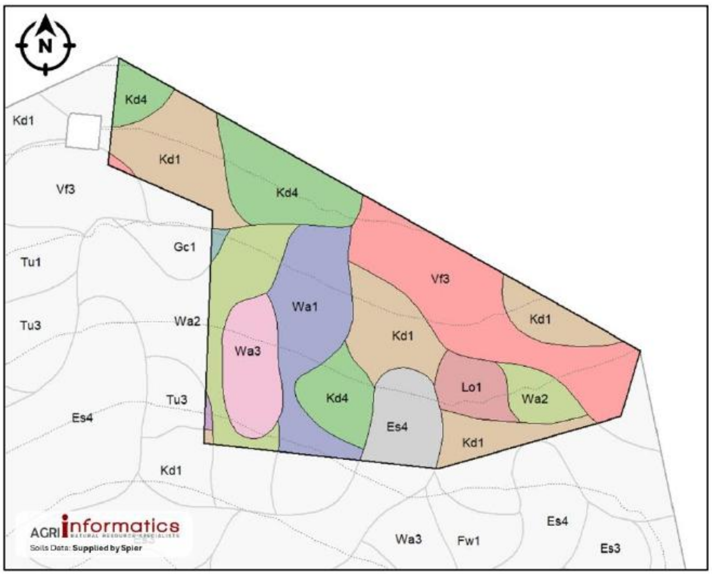


Figure 8: Soils of the solar development area. Contour lines are at 5 m intervals.

Table 4 provides a summary of the key soil properties, as recorded during the 2008 soil survey.

Table 4: A summary of the dominant soil forms and the respective soil potential of the study area.

Map Unit	Dominant Soil Form	Area (ha)	Eff Depth (cm)	Clay % Topsoil	Clay % subsoil	Soil Potential	
						Vines	Winter Vegetables
Es4	Estcourt	1.2	450-600	<6	6-20	MH	M
Gc1	Glencoe	0.1	600-800	<6	6-20	MH	MH-H
Kd1	Kroonstad	4.8	350-450	<6	20-35	M-ML	M
Kd4	Kroonstad	3.2	450-600	<6	20-35	M	M
Lo1	Longlands	0.8	500-800	<6	6-20	ML	M
Tu3	Tukulu	0.0	600-1000	6-15	6-20	MH	MH-H
Vf3	Vilafontes	3.9	450-800	6-15	6-20	M-MH	M-MH
Wa1	Wasbank	2.5	300-450	<6	20-35	ML-M	ML
Wa2	Wasbank	2.2	450-550	<6	20-35	M	M
Wa3	Wasbank	1.4	550-700	<6	20-35	M-MH	M-MH

4.1.5 Vegetation and Grazing Capacity

The natural vegetation of the study area is indicated as Swartland Granite Renosterveld, part of the Fynbos biome. It has an indicated grazing capacity of 25 ha per large stock unit (LSU), which converts to ±4 ha per small stock unit (SSU). The carrying capacity of the solar site of 22 ha thus amounts to only 5 to 6 SSU's, depending on the breed.

4.1.6 Land Capability

The term "land capability" is often used to refer to the suitability of land for agricultural activities. Various independent but similar Land Capability classification systems have been developed or used internationally to classify land. Most systems put strong emphasis on soil properties, but other factors such as climate and topography can also play a role. In an attempt to provide more detailed input to the Preservation and Development of Agricultural Land Bill (PDALB), the former National Department of Agriculture, Forestry and Fisheries (DAFF), expanded the earlier 8-class Land Capability classification of the RSA, to a 15-class Land Capability Map, based on national datasets on Soil, Climate and Terrain capability, with a weighted reference of:

Soil capability = 30%; Climate capability = 40% and Terrain capability = 30%.

The dataset was subsequently incorporated in the national web-based Environmental Screening Tool which re-classified and interpreted the Land Capability Map as follows:

Table 5: Land Capability interpretation as used in the Environmental Screening Tool. (Text indicated in green refers to renewable energy projects.)

Land Capability		Sensitivity Group (Allowance for RE generation[1])		Associated Land Use Types
Value	**Class**	**Within Fields**	**Outside Fields**	
01	Very low	High (0.30 ha/MW)	Low (2.50 ha/MW)	Natural veld with low grazing capacity; marginal dryland cultivated areas
02	Very low			
03	Low-Very low			
04	Low-Very low			
05	Low			
06	Low-Moderate	High (0.25 ha/MW)	Low (2.50 ha/MW)	Some extensive dryland cultivated areas; natural veld with high grazing capacity
07	Low-Moderate			
08	Moderate	High (0.20 ha/MW)	Medium (0.35 ha/MW)	All productive cultivated areas including sugarcane; high value agricultural areas with a priority rating C or D
09	Moderate-High			
10	Moderate-High			
11	High	Very High (0 ha/MW)	Very High (0 ha/MW)	Irrigation, horticulture/viticulture, shade net; high value agricultural areas with priority rating A or B
12	High-Very high			
13	High-Very high			
14	Very high			
15	Very high			

The Land Capability for the study area varies between **Low-Moderate** (07) to **Moderate** (08), as shown in Figure 9. This rating is the result of the Moderate-High terrain and climate ratings, as the soil rating is only Low-Moderate (04) throughout the development envelope.

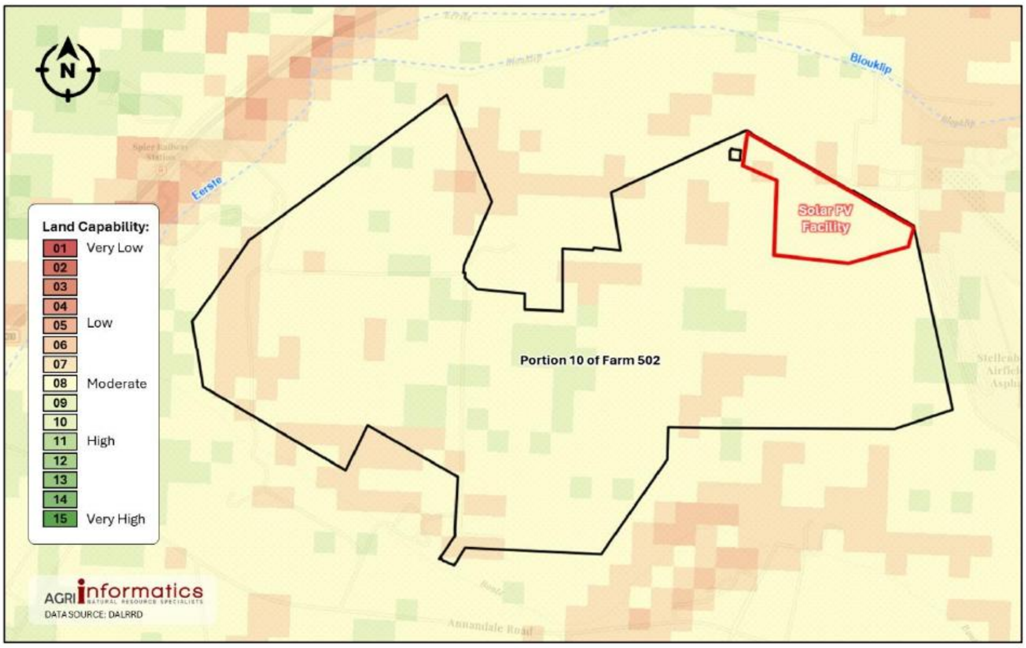


Figure 9: Land Capability map of the study area (DALRRD).

4.1.7 Irrigation

Portion 10 of Farm 502 (the property of which a part is affected by the proposed solar development) has approximately 130 ha equipped for irrigation which varies from permanent irrigation on vineyard blocks to sprinkler systems for supplementary irrigation on pastures used for free range chickens, cattle, pigs and sheep. The property of 365 ha has a minimum of another 80 ha that can potentially be developed, subject to availability of irrigation water.

The proposed solar development does not affect or restrict any of the existing or future irrigation areas. Furthermore, the soils of this portion of land have low suitability for irrigated cultivation and will require full environmental authorisation and permits in terms of CARA for the cultivation of virgin land, prior to being used for crop production. Therefore, the contribution of this land to the irrigated cultivation activities or irrigation potential of Spier Farms is regarded as insignificant.

4.2 Site Visit

A site visit was conducted on 26 September 2024. The main findings were:

- The land is currently unused renosterveld;
- The state of the natural vegetation suggests that is has not been cultivated/disturbed for many years;
- The site is far removed from any of the current actively farmed areas;
- The site is part of extensive areas of the farm that are not intensively utilized at present;
- No signs of significant soil erosion or alien invasion were observed;

- Soil properties observed in ditches and pits, agrees to the general soil types indicated by earlier soil mapping and confirms limitations in soil depth and the presence of albic, prismacutanic and gleyed subsoil;
- The abutting land to the east is part of the Stellenbosch Aerodrome facility;
- The abutting land to the north is part of the De Zalze Winelands Golf Estate. This land has been used for irrigated cultivation of crops in the past, but is fallow land at present;
- The site is situated next to an electrical substation which, presumably will be used for connection to the local grid.

The following photographs provide an overview of the agricultural activities and general condition of the orchards.

Existing substation next to the proposed solar development site.

Exposed soil profile in a ditch within the proposed solar development site, with albic horizon and gleyed subsoil, transitioning to hard plinthic horison.

Northern boundary of the proposed solar development site, with open fields of the De Zalze Winelands Golf Estate to the north (left) of the fence.

View over the proposed solar development area, looking southward.

Eastern boundary of the proposed solar development site, with buildings of the Stellenbosch Aerodrome visible on the left.

Farm track over the proposed solar development area, looking westward.

Free range chicken farming on irrigated pastures, elsewhere on the farm.
(NOT AT THE DEVELOPMENT SITE)

Cattle grazing on irrigated pastures, elsewhere on the farm. (NOT AT THE DEVELOPMENT SITE)

Irrigated vineyards, elsewhere on the farm. (NOT AT THE DEVELOPMENT SITE)

4.3 Resulting Site Sensitivity

The desktop assessment and the site visit confirmed the absence of cultivated agriculture and the limited agricultural potential and thus confirms the presence of “Medium to Low” agricultural sensitivity, as proposed by the Screening Tool.

Thus, an **Agricultural Compliance Statement**, as prescribed by the NEMA protocol, is deemed appropriate for the proposed agrivoltaic facility.

5 Agricultural Compliance Statement

Subsequent to the findings of the Site Sensitivity Verification, the following facts are presented in fulfillment of the minimum reporting requirements for Agricultural Compliance Statements (as per Government Notice 320, published in the Government Gazette 43110, dated 20 March 2020).

5.1 Site Sensitivity Map

[Provide a map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool.]

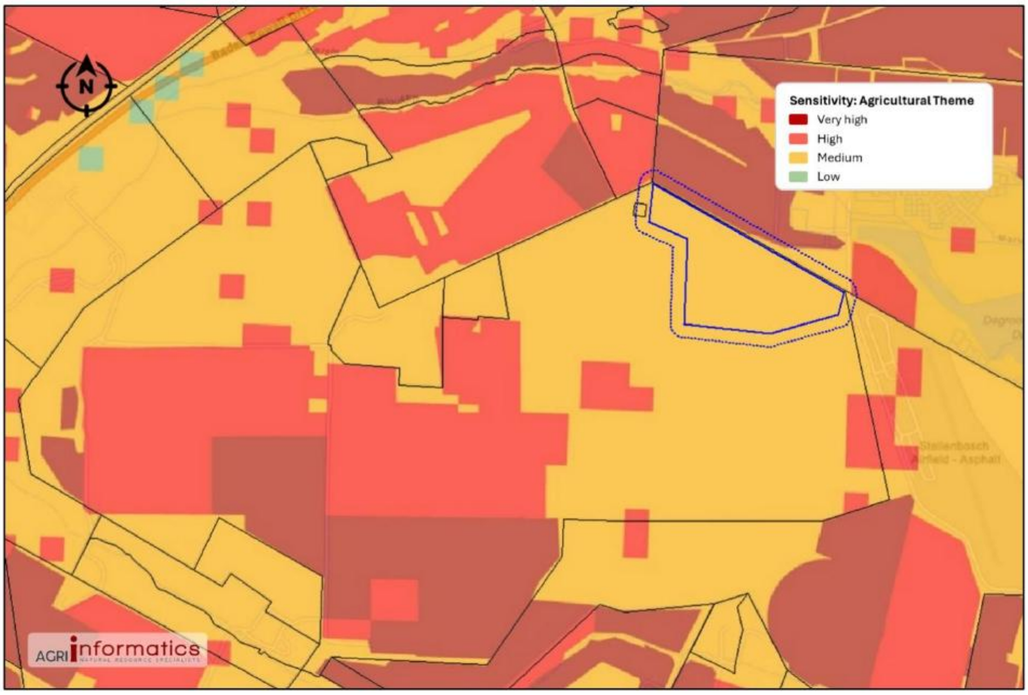


Figure 10: Agricultural Sensitivity as indicated by the Screening Tool of DFF&E with a 50m buffer line around the development envelope.

The agricultural sensitivity of the site is **medium**. A portion of the neighbouring property to the north, within the 50 m buffer is indicated as **very high**. This high sensitivity is the result of that land being used for irrigated cultivation in the recent past. While it is fallow at present, the land can be used for intensive crop production again in future and therefore the very high sensitivity is regarded as justified and correct. The proposed solar facility is not expected to have any limitation on the possible future cultivation of this land.

5.2 Confirmation of Allowable Development Limits

[Confirm that the development footprint is in line with the allowable development limits contained in Table 1 of the Protocol.]

The allowable development limit for areas outside of field boundaries with a Low Sensitivity is 2.5 ha per MW generation capacity. The indicated generation capacity of the Soventix Saldanha Solar PV facility is 8.8 MWp and thus a maximum development footprint of **22 ha** is allowed.

The total area of the development envelope within which the solar facility will be accommodated is 20.0 ha which thus falls within the allowable development limit.

5.3 Confirmation of Micro-siting

[Confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimize fragmentation and disturbance of agricultural activities.]

The proposed development footprint of the solar PV facility is situated in the far northeastern corner of the farm, more than 700 m from the nearest cultivated area on the farm. The land has not been cultivated for more than 30 years and can only be used for extensive grazing at present. The site is near an existing substation, and thus no long overhead powerlines will be required to connect the facility to the local grid. The position will not impact on any current farming activities and also not impede on the future expansion of more intensive farming activities. The micro-siting of the facility is therefore regarded as optimal.

5.4 Acceptability of the Development

5.4.1 Specialist Statement

[Provide a substantiated statement with regards to agricultural resources on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development.]

The potential of the soils of the development site varies between medium-low to medium-high. With appropriate soil preparation and irrigation, the site has the potential to be used for intensive crop production. However, within the context of the rest of the farm, it is highly unlikely to be developed for cultivation within the medium to long term, due to the following facts:

- It is situated far from the existing irrigation and other farming infrastructure;
- There is ample land with similar or better soils available for expansion closer to the existing infrastructure;
- Developing the land will require encompassing environmental authorisation and approval for the clearing of vegetation for cultivation in terms of CARA;

The applicant proposes the implementation of the concept generally known as *Agricvoltaics* for the development of the solar PV facility. Agrivoltaics, involves the installation of solar panels above crops, creating a dual-use system that can potentially enhance the efficiency of land use while providing additional benefits, such as microclimate moderation and crop protection against excessive wind and/or sunlight. In the case of the Spier agrivoltaic facility, no crop production is proposed, but rather the retention or enhancement of the grazing capacity of the vegetation and the utilization thereof by small stock. The agricultural (grazing) potential of the land will thus not be lost, but more importantly the vegetation cover will be retained, which will protect the soil from erosion or degradation while surface runoff will be mitigated. The benefit of the retention of the grazing capacity is small (6 SSU's with the current vegetation – see paragraph 4.1.6) and rather irrelevant given the extensive grazing opportunities elsewhere on the farm.

The very high agricultural sensitivity of the neighbouring land to the north – as indicated by the Screening Tool – is the result of land that was previously used for irrigated cultivation. This land is fallow at the moment, but can be used for intensive crop production again in future. The solar facility as proposed, will have no impact on such possible future cultivation.

The development site is directly next to an existing substation and therefore there will be no need for long overhead powerlines. Also, the development footprint of the facility falls within the allowable limits.

The above arguments and factors are all in support of the application and thus approval is recommended, irrespective of the implementation of an agrivoltaics or conventional solar PV option.

5.4.2 Special Conditions

[Stipulate any conditions to which this statement is subjected.]

Should the developer indeed opt for the installation of an agrivoltaic system, the solar panel support system should allow for adequate sunlight reaching the crop by elevating panel heights and should accommodate periodic implement movement between the arrays, such as a brush-cutter, through adequate spacing of the legs of support systems.

5.4.3 EMPr requirements

[Where identified, propose impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr).]

The impacts normally associated with the development of renewable energy facilities on farm land relates to (i) the loss of land for cultivation or grazing caused by the actual footprint of the facility, (ii) the loss of resources (soil and/or vegetation) due to the degradation or removal thereof during construction, (iii) the alteration of surface runoff that may lead to erosion and soil loss and (iv) reduction in optimal land use (farming activities) imposed by the construction activities that limits access and use of precincts of the farm. While most of the impacts are either of a temporary nature or can be effectively mitigated by good engineering principals and effective construction site management, the loss of land to the footprint of the facility is of a more permanent nature and potentially significant, depending on the sensitivity of the receiving environment.

In the case of the Spier agrivoltaic facility the sensitivity of the receiving environment is not high and the following impact management protocol is recommended:

- Liaise and coordinate construction activities with landowners/farm mangers to minimise disruption to farming activities;
- Contain vehicle movement to single tracks as far as possible. All service routes that will be used to gain access to the renewable energy structures for maintenance purposes have to be covered in gravel, tarred or compressed in order to limit the possibility of degradation and erosion. All access routes, existing or newly constructed and utilized during the construction and / or maintenance of the renewable energy structures should be restore to its original state after completion of the establishment of the structures. Ever care should be taken not to damage or degrade the status of the natural resources base of the farm during the construction phase of the mentioned or to impact negatively on the farming or production practices on the farm;
- Keep disturbance to, or removal of vegetation to the absolute minimum. Every care should be taken before, during and after the construction and future maintenance of the renewable energy structure, supporting infrastructure or access routes to protect the vegetation and veld condition against deterioration and destruction;
- Prevent disturbance to natural drainage systems. No renewable energy structure, supporting infrastructure or access routes should be constructed on a wetland, vlei, pan, drainage line or any other water body unless duly authorised. No renewable energy structure, supporting infrastructure or access routes shall in any manner divert any run-off water from a water course to any other water course or obstruct the natural flow pattern of runoff water unless duly authorised;
- Prevent soil erosion or degradation. No renewable energy structure, supporting infrastructure or access routes should result in soil loss as a result of erosion through the action of water or wind. It is the responsibility of the owner of the renewable energy project to ensure that suitable soil conservation works be established on the site to limited or restrict the loss of soil. Provide adequate water runoff control structures where access roads or tracks could induce increased runoff or channelling of runoff water;
- The installation of the underground power cables should not negatively impact on the resource base of the site. During the installation no soil conservation structure should be disturbed, the soil texture should be restored – including the prevention of the placement of subsoil clay on the surface, the work area should not be wider than 5 m, it should not be directed through existing or future cultivated land nor impact negatively on existing farming infrastructure or any farming activity.
- Prevent oil and/or fuel spills from construction vehicles or equipment and apply appropriate rehabilitation measures should a spill occur.

5.5 Knowledge Gaps

[Provide a description of the assumptions made and any uncertainties or gaps in knowledge or data.]

No gaps in knowledge or data that could alter the assessment or recommendation have been identified.

6 References

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7 APPENDIX

- Curriculum Vitae: FH Knight
- Vegetation Memoir: FRg 2
- Land Type Memoir: Ca28

Curriculum Vitae: FH Knight

François H Knight

AGRICULTURAL RESOURCE SPECIALIST
Agri Business Development
Soil Science / Agronomy / Irrigation Engineering

STELLENBOSCH, SOUTH AFRICA

CONTACT DETAILS

Pinotage Close
Nooitgedacht Village
Stellenbosch, SOUTH AFRICA
francois@agriinformatics.co.za
+27 82 658 7776

CORE SKILLS

English	●●●●●
Afrikaans	●●●●●
Leadership	●●●●●
Management	●●●●●
Strategic Planning	●●●●●
Motivation	●●●●●
Communication	●●●●●
Computer skills	●●●●●
Analysis	●●●●●
Administration	●●●●○
Delegation	●●●●○

PROFILE

Experienced and goal driven agricultural specialist, enthusiastic about the future of farming in Africa. With more than 35 years of experience, from research to extension to farming, he brings a wealth of knowledge to any agribusiness operating on the continent. His passion for the nature and people of Africa motivates him to make a difference here, while his drive for sustainability underpins his sense for bottom-line profit.

His involvement in the blueberry industry since 2014, has added a fresh passion for precision farming of export products.

RÉSUMÉ

François was born in Johannesburg, South Africa but grew up in the Karoo and matriculated from High School Laingsburg in 1980, a mere 2 months before his family home was swept away in the great flood of January 1981. At school he was chairman of the debate society and captain of his rugby team and participated in rugby, tennis, target shooting and cadets.

He obtained an Honours degree in Agricultural Science from the University of the Free State in 1986, whereafter he did his basic compulsory military training at Intelligence School, before being elected to 47 Survey Squadron's Terrain intelligence unit. The SA Defence Force enrolled him at Potchefstroom University for a post graduate diploma in Terrain Evaluation, which included field surveys of parts of the Kruger National Park and SA Army Battle School, Lohatlha. He received the rank of Lieutenant in 1987 and was Officer in Command of the field Task Groups. While being in civil service of the SANDF, he was commissioned to the rank of Captain in 1994, by the late Nelson Mandela.

Directly after completing his studies at UFS in December 1986, Francois was also appointed as Soil Physics Researcher of the former Elsenburg Agricultural Development Institute (now Western Cape Department of Agriculture). After completion of his 2 years of military training, he returned to Elsenburg but was directly seconded to Stellenbosch University for a Master's Degree in Agricultural Science, which he received in March 1991 *cum laude*, with the *Movement and Management of Water in Stony Irrigated Soils* as subject, to address irrigation return flow problems associated with the vineyard developments on the foot slopes along the Breede River valley.

During the next 5 years as a Soil Scientist at Elsenburg, he was tasked with crop modelling of winter cereals and attended a CERES crop modelling course at the International Fertiliser Development Centre at Muscle Shoals, Alabama, US. He extended this travel to include visits to the US Water Conservation Laboratory, Phoenix; US Salinity Laboratory, Riverside; Centre for Irrigation Technology, Fresno; Department of Land, Air and Water Resources, UC Davis; Prof Gaylon Campbell, Washington State University, Pullman; Cornell University, Ithaca, Dept Crop and Soil Sciences, University of North Carolina, Raleigh.

He studied and measured the soil-plant-atmosphere continuum of winter cereals in the Western Cape in various localities and climatic conditions. He expanded his studies to Ph.D.-level research on the water balance, irrigation and nutrient management of irrigated potatoes in the highly permeable soils of the Sandveld of the Western Cape. He also conducted research on the efficiency of natural gypsum deposits on soil amelioration and as source of Calcium in potato nutrition.

In 1995, Francois was appointed as head (Assistant Director) of the Natural Resource Utilisation division of Elsenburg, which then incorporated the GIS capability and spatial modelling functions of the Western Cape Department of Agriculture. In addition to his administrative functions including financial and personnel management, he was also responsible for the development of GIS-based crop modelling for 14 different crop types grown in the Western Cape while incorporating economic variables. This enabled the compilation of profitability maps for the full range of crop types as well as the spatial impact of changes in economic variables, such as import tariffs or exchange rate, on profitability of production.

His research lead to further study tours to Israel, Scotland, England, The Netherlands and Belgium. He later developed a systematic procedure for the spatial analysis of wine terroirs at individual farm level, enabling detailed planning and farm optimisation recommendations.

In 2001, Francois founded Agri Informatics, a specialist consultancy firm in farm planning and optimisation, natural resources and climate-plant interactions. He initiated the design and development of a vineyard information management system (WineMS) with VinPro in 2001 – 2003. As principal consultant he delivered consultancy services to more than 300 clients over a 15-year period, ranging from national studies, such as the Macro Scale Terroir Analysis of South Africa for Winetech and the strategic demarcation of optimal growing regions of 22 crop types for Woolworths, to regional studies, like the Climate Assessment of the Orange River Valley from Jacobsdal to Blouputs for the Orange River Wine Producers, an assessment of the optimal water management plan for the Stompdrif and Kammanassie Dams, in collaboration with Ninham Shand and the Agricultural Assessment of the Baviaanskloof for Conservation South Africa. His work extended to Southern African countries, including Angola, Zambia, Zimbabwe, Lesotho and Namibia. He even did a terroir analysis for Domaine Gayda in France.

Francois developed a satellite-based remote sensing service for vineyard management planning in 2004 using Quickbird imagery, when 60cm per pixel was regarded as high resolution. The service was later switched to aircraft platforms to obtain higher resolutions and more flexibility. As a hobby, he has been building and flying drones since 2014, experimenting with various Vegetation Index sensing and processing solutions.

Environmental sustainability and impact became increasingly integrated in his consultancy work and lead to his involvement in impact assessments for more than 15 wind farms or solar parks in South Africa. He was also the lead consultant in the compilation of a Biodiversity Best Practice Guideline for Potato Production in the Sandveld and a team member in the development of an Environmental Management Framework for the Sandveld

He is the author or co-author of 16 scientific papers. His work has been the topic of articles in Popular Mechanics, Wineland magazine and Die Burger newspaper. He has been interviewed by RSG (WineMS), Landbou Radio (Terroir Analysis) and e.TV (Climate Change). He made presentations at various congresses including SSSSA, CSSSA and GISSA as well as many symposia and was guest lecturer at the University of Stellenbosch to pre- and post-graduate students, Elsenburg College and for two consecutive years presented the soil science module as part of the SABI accreditation course.

Since 2014, Francois has been directly involved in farming as Managing Director of a blueberry farm in the Western Cape, as well as the project planner for a large-scale blueberry farm in the Kavango Region of Namibia. He has gained invaluable experience in aspects like market analysis, project & financing planning, financial, asset & personnel management, export product protocols and standards, cold chain management, social development programmes and statutory processes. This role was terminated in 2020, to again offer dedicated consultancy services to existing and new clients.

EDUCATION

1991: M.Sc.Agric. cum laude — **US, Stellenbosch**
Specialised in soil physics with thesis: *The movement and management of water in stony irrigated soils.*

1988: Post Grad. Dip. Terrain Evaluation — **UNW, Potchefstroom**
Geology, Soil Mechanics, Geography, Botany, Computer Science.

1986: B.Sc.Agric.Hons. — **UFS, Bloemfontein**
Main subjects Soil Science (Hons), Agronomy III and Irrigation Engineering III.

1980: Matric **Laingsburg High School**
Mathematics, Physical Science, Biology, Accounting, Afrikaans, English
Captain of Rugby team U.15 & U.19; Chairman Debating Society

EXPERIENCE

2015 – 2020: Executive Director: Business Development **Vangoberry, Paarl**

- Founder and 50% partner of Vangoberry, a blueberry farm development and management company.
- Developed and managed Berrybase, a blueberry farm near Wolseley in the Western Cape of South Africa as 25% shareholder. Exited this project in 2018, after achieving a record breaking first harvest of 28 t/ha.
- Secured 1350 ha of land and irrigation water in the Kavango East region of Namibia for intensive agricultural production.
See www.vangoberry.co.za

2001 – present: Founder and Principal Consultant **Agri Informatics, Stellenbosch**
Founder of Agri Informatics, a private firm offering a consultancy service to the agricultural industry on:

- Natural resource potential assessments – soil surveys, climate analysis, topographic analysis, farm potential, etc.
- Farm design and layout
- Agricultural component of environmental impact assessments
- Operational and business plans
- Compilation of Best Practice Guidelines

Over two decades, consultancy services were delivered for a range of crops including, wine and table grapes, deciduous and stone fruit, citrus, olives, lucerne and grain crops as far as France, but mostly in Southern Africa.
See addendum for list of key projects. Also: www.agriinformatics.co.za

1995 – 2001: Assistant Director: Resource Utilisation **Dept of Agriculture, Elsenburg**
Promoted to Assistant Director at the age of 32, responsible for the design and development of a GIS-based natural resource inventory of the Western Cape. As division head, responsible for all administrative functions of budgeting, reporting, personnel and inventory management. Also gained full proficiency in the ESRI suite of geographic information systems.

1989 – 1995: Soil Scientist **Dept of Agriculture, Elsenburg**
Extensive experience in natural systems modelling, land use potential and agriculture vs. environment studies, as well as project management while senior researcher. Major projects, as project leader, included:

- Water balance studies and crop simulation modelling of wheat in the Western Cape.
- Development of nutrient and irrigation scheduling guidelines to minimise environmental impact of potato production in the Sandveld.
- Yield potential modelling of key crops in the Western Cape as input to economical optimisation modelling in preparation of Western Cape Agricultural Summit.
- Terroir analysis for the SA Wine Industry through Project: Vision 2020.
- Development of an environmental impact-potential estimation methodology as study leader for M-student.
- Development of methodology for the estimation of the primary biomass production potential of the Western Cape.

1987 – 1988: Pedologist (Soil Mapping) **SADF, Engineering Corps**
Officer in command of 47 Survey Squadron's field team responsible for soil and vegetation mapping during compulsory military training. Gained valuable experience in field surveys, mapping and soil classification.
Attained the rank of Captain.

AFFILIATIONS

Soil Science Society of South Africa
South African Council for Natural Scientific Professions – 149315 (Registration pending)

INTERESTS

He has a keen interest in drone technology, remote sensing and their applications in precision agriculture, but eagerly shares his core passions in life:

- The African bush (or desert – after growing up in the Karoo)
- Golf (or rather a form of sport that resembles golf)
- Photography
- Aviation

SKILLS & EXPERIENCE

During his career, he was exposed to, received formal training and/or mastered the following skills:

Skill / Experience	Level
General Computer Literacy	Very proficient
MS Word, Excel, PowerPoint	Very proficient
GIS & Spatial Analysis	Specialist
Communication & Presenting	Very proficient
Report Writing	Very proficient
Budgeting & Financial Modelling	Very proficient
Agribusiness Assessment and Modelling	Specialist
Project Planning (Objectives, Deliverables, Deadlines, Schedules, Costing, etc.)	Very proficient
Business Systems and SOP Development	Very proficient
Financial Management & Accounting	Proficient
Personnel Management	Proficient
Change Management	Proficient
Environmental Management	Proficient
English & Afrikaans (Read, Write & Communicate)	Very proficient
Teamwork	Very proficient
Cold Chain Management	Experienced
Fruit Export Protocols and Standards	Experienced
Community Interaction	Experienced
Soil Classification and Mapping	Experienced
Plant Nutrition and Fertigation	Experienced
Crop Modelling and Decision Support Systems	Experienced
Scientific Research Methodology	Experienced
Remote Sensing (Platforms and Processing)	Experienced
Plant Health & Agrochemicals	Basic
Singing	False

REFERENCES

Pieter Brink: Manager: Agronomic Services and Research Yara South Africa:	+27 82 658 6005
Cor van der Walt: Land Use Manager Dept of Agriculture: WC	+27 83 460 5830
Jannie Gutter: CEO 4Arrows Mining & Engineering	+27 82 652 3230

BIO

Date of Birth:	7 May 1963
Nationality:	South African
ID:	630507 5044 08 8
Marital Status:	Divorced
Dependent Children:	None
Criminal Record:	None
Drivers Licence:	Heavy Vehicle

PUBLICATIONS

Scientific, Semi-scientific, Congress Papers and Academic Reports

Knight, F.H, 1991. Die beweging en bestuur van water in klipperige besproeiingsgronde. M.Sc. Agric. Tesis. Universiteit van Stellenbosch, Stellenbosch.

Knight, F.H. & MOOLMAN, J.H., 1992. Die vloeiregime van water in 'n klipryke besproeiingsgrond uit skalie. 17th Congr. Soil Sci. Soc. S. Afr., Stellenbosch: 28-30 January, 1992.

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Knight, F.H., 1995. Die gebruik van natuurlike gipsafsettings as bron van landbougips. Elsenburg Landbou-ontwikkelingsinstituut. Departement van Landbou: Provinsie Wes-Kaap.

Arckoll, D., Landman, L. & **Knight, F.**, 1998. Suitable areas for growing canola and its market in the Western Cape, Els. J. 2, 1-6.

Knight, F.H., 1999. Logingsverliese van makro-elemente op sandgronde. Aartappelkortkursus, LNR Roodeplaat.

Knight, F.H., Brink, P.P. & Van Der Walt, C.J., 2000. Effect of ammonium : nitrate ratio in a potato field trial on sandy soils with a low nitrification potential.

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Brink, P.P., Combrink, N.J.J. & **Knight, F.H.**, 2000. Die waarde van petioolsap analise in die optimalisering van N-voeding by aartappels (Solanum tuberosum l.) in sandgronde. M.Sc. Thesis, Universiteit Stellenbosch.

Brink, P.P., Combrink, N.J.J. & **Knight, F.H.**, 2001. Petiole nitrate measurement as a guide for N fertilisation of potatoes (Solanum tuberosum L.) on sandy soils. Plant & Soil.

Knight, F.H., Conrad, J. & Helme, N., 2007. Biodiversity Best Practice Guidelines for Potato Production in the Sandveld. Prepared for Potato South Africa and CapeNature. Agriinformatics, GEOSS and NickHelme Botanical Surveys.

Knight, F.H., 2012. Agricultural Assessment of the Baviaanskloof. Commissioned report to GreenChoice, an initiative of Conservation South Africa.

Du Plessis, C., De Villiers, C., **Knight, F.H.**, McDonald, D., Conrad, J., Van Zyl, H., De Wit, M., 2016. Environmental Management Framework for the Sandveld.

Knight, F.H., 2019. Okavango Delta: Impact of Irrigation Development in Namibia.

Popular Articles

Graham Beck Wines Viticulture Project: Satellite technology taken to new heights, **Wine Magazine**. 1 December 2004
A Vintage Made In Heaven, **Popular Mechanics**. 31 March 2006.

KEY PROJECTS OF AGRI INFORMATICS

Typical projects include:

- GIS based environmental studies and farm optimisation planning for leading Wine Estates, such as De Wetshof, Zandvliet, Tokara, Thelema, Graham Beck Wines, Rupert & Rothchild, L'Ormarins, Kanonkop, Paul Cluver, Bouchard Finlayson, Beyerskloof, Meerendal, Diemersdal, Bloemendal, Klein Constantia, Constantia Uitsig, Charles Back Wines, Meerlust, Vergelegen, Lourensford and many more.
- In a multi-disciplinary environment, agricultural potential studies were, amongst others conducted for the City of Cape Town (Mamre Agricultural Development Plan), Great Cormorant Investments (Goergap), Ninham Shand (Stompdrift – Kammanassie Irrigation Water Optimisation Study), Northern Cape Wine Association (Orange River Terroir Study) and Winetech (Vineyard Potential of South Africa).
- As agricultural consultant, has conducted Agricultural Impact Assessments on several urban and rural developments for Urban Dynamics Western Cape, CEBO Planning, MCA Planners, NM & Associates, Dennis Moss Partnership, IC@Plan, Jan Hanekom Partnership, Cape EAPrac & Doug Jeffery Environmantal Consultants, Environmental Partnership, Anél Blignaut Environmental Consultants, NuPlan, SiVEST Environmental, Arcus Gibb, Savanna, CCA Environmental, Mott MacDonald PDNA, Terramanzi, Cornerstone Environmental, Similan Property Developers, PHS Consulting, CMAI and Ecoleges Environmental Consultants
- As team leader, compiled Biodiversity Best Practice Guidelines for potato production in the Sandveld in association with GEOSS and Nick Helme Botanical Surveys.
- As team member, conducted for GreenChoice (WWF & Conservation International) an assessment of the gains obtained through Biodiversity Initiatives in the Cape Floristic Region.
- Conducted, for Woolworths (a leading fresh produce retailer) an encompassing climate study on South Africa to identify the best suited areas for the production of a wide range of crops and to assess the potential impacts of climate change on their supply chain.
- Contracted by Environmental Partnership to assist with the compilation of a Baseline Assessment for the Central Karoo District Environmental Management Framework.
- Conducted agricultural impact assessments on more than twenty wind farm projects in five provinces of South Africa.
- Conducted agricultural impact assessments for solar parks at three sites in the Western Cape, three sites in the Free State and one in Limpopo Province.
- Conducted agricultural feasibility assessments for several irrigation farms in southern, central and northern Namibia. Was also contracted by the Karas Regional Council to conduct a high-level agricultural plan for Bethanie.
- Contracted by Conservation SA/Green Choice to conduct a strategic agricultural assessment of the agricultural potential, opportunities and constraints of the Baviaanskloof Hartland Initiative.
- Contracted by CiVEST to conduct agricultural assessment for the Klapmuts EMF.
- Conducted an agricultural assessment of the Qunu precinct, as part of an integrated development plan for the hometown of the late former president Nelson Mandela.
- Sub-consultant to Mott MacDonald for the development of an Environmental Management Plan for the Sandveld Region of the Western Cape, where conflict exist between environmental objectives and the two main farming activities, namely intensive potato production irrigated from groundwater sources and dryland rooibos tea production.
- Sub-consultant to PHS Consulting as part of the EIA team for the development of the new Cape Winelands Airport.
- Extensively involved in agricultural development (lucerne, grain, fruit, wine grapes and berries) in South Africa, Namibia, Lesotho and Angola.
- Conducted a strategic assessment for the Independent Grower's Association on the sustainability of the blueberry industry, with specific reference to the effect of growing area, plant genetics and marketing models on profitability.
- Undertook a case study in support of the implementation of Agrivoltaics in South Africa with specific reference to the Philippi Horticultural Area.

Vegetation Type Memoir: FRg 2 Swartland Granite Renosterveld

VT 46 Coastal Renosterbosveld (66%), VT 47 Coastal Macchia (30%) (Acocks 1953). LR 62 West Coast Renosterveld (77%), LR 68 Sand Plain Fynbos (22%) (Low & Rebelo 1996). BHU 31 Swartland Coast Renosterveld (59%), BHU 32 Boland Coast Renosterveld (32%) (Cowling et al. 1999b, Cowling & Heijnis 2001).

Distribution Western Cape Province: Discrete areas in the Swartland and Boland: largest patch centred on Darling from Ratelberg in the north to Dassenberg near Mamre and Pella; several centred on Malmesbury from Darmstadt in the north to the lower slopes of the Perdeberg (and small patches to the west towards Atlantis); east of Wellington from Micha to Valencia, lower surrounds of Paarl Mountain; Joostenberg, Muldersvlei, Bottelaryberg, Papegaaiberg (Stellenbosch West), to Firgrove and northern Somerset West. Altitude 50–350 m.

Vegetation & Landscape Features Moderate foot slopes and undulating plains supporting a mosaic of grasslands/herblands and medium dense, microphyllous shrublands dominated by renosterbos. Groups of small trees and tall shrubs are associated with heuweltjies and rock outcrops. The boundary with FFg 2 Boland Granite Fynbos is diffuse and patchy.

Geology & Soils Coarse sandy to loamy soils of a variety of forms ranging from Glenrosa and Mispah, to prismacutanic and pedocutanic diagnostic horizons to red-yellow apedal soils—all derived from Cape Granite. The soils can contain a considerable volume of moisture in winter and spring. Land types mainly Fa, Ca, Db and Ac.

Climate MAP 360–790 mm (mean: 520 mm), peaking from May to August. Mists common in winter. This is the wettest renosterveld unit. Mean daily maximum and minimum temperatures 27.7°C and 6.7°C for February and July, respectively. Frost incidence about 3 days per year. See also climate diagram for FRg 2 Swartland Granite Renosterveld (Figure 4.117).

Important Taxa ([T]Cape thickets) Tall Shrubs: *Euclea racemosa* subsp. *racemosa*[T] (d), *Olea europaea* subsp. *africana*[T] (d), *Putterlickia pyracantha*[T] (d), *Rhus laevigata*[T] (d), *Aspalathus acuminata* subsp. *acuminata*, *Chrysanthemoides monilifera*, *Diospyros glabra*[T], *Dodonaea viscosa* var. *angustifolia*, *Myrsine africana*[T], *Passerina corymbosa*, *Rhus angustifolia*[T], *R. crenata*[T], *R. tomentosa*[T], *R. undulata*[T], *Wiborgia obcordata*. Low Shrubs: *Anthospermum aethiopicum* (d), *Elytropappus rhinocerotis* (d), *Eriocephalus africanus* var. *africanus* (d), *Felicia filifolia* subsp. *filifolia* (d), *Maytenus oleoides* (d), *Salvia lanceolata* (d), *Anthospermum galioides* subsp. *galioides*, *Aspalathus hispida*, *Asparagus rubicundus*, *Athanasia trifurcata*, *Chironia baccifera*, *Erica paniculata*, *Galenia africana*, *Gnidia squarrosa*, *Helichrysum cymosum*, *H. dasyanthum*, *H. revolutum*, *H. teretifolium*, *Hermannia alnifolia*, *H. hyssopifolia*, *H. prismatocarpa*, *Leucadendron lanigerum* var. *lanigerum*, *Lobostemon argenteus*, *L. fruticosus*, *Nenax hirta* subsp. *hirta*, *Oftia africana*, *Phylica thunbergiana*, *Rhus dissecta*, *R. rosmarinifolia*, *Salvia africana-caerulea*, *Stoebe cinerea*. Succulent Shrub: *Lampranthus sociorum*. Woody Climbers: *Cissampelos capensis*, *Microloma sagittatum*. Herbs: *Helichrysum crispum* (d), *Annesorhiza macrocarpa*, *Cotula turbinata*, *Hebenstretia paarlensis*, *Lichtensteinia obscura*, *Stachys aethiopica*. Geophytic Herbs: *Mohria caffrorum* (d), *Chlorophytum undulatum*, *Geissorhiza monanthos*, *Moraea papilionacea*, *Oxalis obtusa*, *O. pes-caprae*, *O. purpurea*, *Pelargonium longifolium*, *Romulea eximia*, *R. rosea*, *Sparaxis parviflora*, *Watsonia borbonica* subsp. *borbonica*. Succulent Herb: *Crassula capensis*. Herbaceous Climber: *Cynanchum africanum*. Graminoids: *Ehrharta calycina* (d), *E. villosa* var. *villosa* (d), *Ischyrolepis gaudichaudiana* (d), *Cymbopogon marginatus*, *Ehrharta longiflora*, *E. ottonis*, *E. thunbergii*, *Ischyrolepis capensis*, *Thamnochortus bachmannii*, *Themeda triandra*, *Tribolium uniolae*.

Endemic Taxa Low Shrubs: *Agathosma hispida*, *A. latipetala*, *Aspalathus glabrata*, *A. rycroftii*. Succulent Shrubs: *Antimima menniei*, *Erepsia hallii*, *Lampranthus citrinus*, *L. scaber*, *Phyllobolus suffruticosus*, *Ruschia klipbergensis*. Herbs: *Arctopus dregei*, *Oncosiphon glabratum*. Geophytic Herbs: *Babiana pygmaea*, *B. regia*, *B. rubrocyanea*, *Geissorhiza darlingensis*, *G. eurystigma*, *G. malmesburiensis*, *G. mathewsii*, *G. radians*, *Haemanthus pumilio*, *Ixia aurea*, *I. curta*, *Lachenalia purpureo-caerulea*, *Moraea amissa*, *Oxalis stictocheila*, *Watsonia humilis*.

Conservation This is a critically endangered vegetation unit of which almost 80% has already been transformed due to prime quality of the land for agriculture (vineyards, olive orchards, pastures) and also by urban sprawl. Hence the conservation target of 26% remains unattainable. Only very small portions (0.5%) enjoy statutory protection in the Paarl Mountain Nature Reserve and Pella Research Site, and also (2%) in the Paardenberg, Tienie Versveld Flower Reserve near Darling and in the Duthie Nature Reserve in Stellenbosch. Alien grasses are particularly pervasive, the most important being *Lolium multiflorum*, *Avena fatua* and *Bromus diandrus* (Musil et al. 2005). Alien woody species include *Acacia saligna*, *Pinus pinaster* as well as various species of *Eucalyptus*. Erosion very low, low and moderate.

Remarks The grassland phases of this vegetation unit as well as the rocky outcrops are particularly rich in geophytes. Several regional and local endemic taxa are shared with FRs 9 Swartland Shale Renosterveld.

References Acocks (1935), Boucher & Moll (1981), Boucher (1983, 1987, 1999b), Jacobs (1984), Landman & Nel (1989), Boucher & Rode (1994, 1999), Nel (1995), Von Hase et al. (2003), Musil et al. (2005), N. Helme (unpublished data).

Land Type Memoir: Ca28

LAND TYPE/ *LANDTIPE* : **Ca28**
CLIMATE ZONE/ *KLIMAATSONE* : 2603W
Area/ *Oppervlakte* : 3645ha
Estimated area unavailable for agriculture
Beraamde oppervlakte onbeskikbaar vir landbou : 50ha

Occurrence (maps) and areas / *Voorkoms (kaarte) en oppervlaktes:*
3318 Cape Town (3645ha)

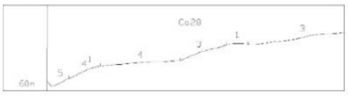
Inventory by/ *Inventaris deur:*
F Ellis, C W van Huyssteen & B Stehr
Modal profiles/ *Modale profiele:*
Geen/None

Terrain unit/ *Terreineenheid*	1	3	4	4(1)	5
% of land type/ *% van landtipe*	10	35	35	5	15
Area/ *Oppervlakte (ha)*	364.5	1275.75	1275.75	182.25	546.75
Slope/ *Helling (%)*	1 - 4	4 - 8	1 - 3	2 - 4	0 - 2
Slope length/ *Hellingslengte (m)*	250 - 3000	400 - 800	1000 - 180	300 - 600	200 - 500
Slope shape/ *Hellingsvorm*	Y-Z	Y	Z	X-Z	Z-X
MB0,MB1 (ha)	145	1086	1237	181	547
MB2-MB4 (ha)	219	192	38	0	0

Total/ *Totaal*: S>12% 0; S<12% 3196; 449

Soil series or land classes / *Grondseries of landklasse*	Depth / *Diepte* (mm)	MB	1 %	1 ha	3 %	3 ha	4 %	4 ha	4(1) %	4(1) ha	5 %	5 ha	Total/ *Totaal* ha	%	Clay content / *Klei-inhoud* % A	E	B21	Hor	Texture / *Tekstuur* Class / *Klas*	Depth limiting material / *Diepte-beperkende materiaal*
Katarra Kd22, Hamman Wa30	300 - 450	0	5	18	45	574	45	574	20	36	10	55	1257	34.5	0-6	0-6	20-35	E	coSa-LmSa	gc;hp
Tayside Lo30	400 - 800	0			5	64	15	191	40	73	20	109	437	12	0-6	0-6	8-20	E	coSa-LmSa	sp
Glenrosa Gs15, Trevanian Gs17 Paardeberg Gs12	250 - 350	3	40	146	10	128	3	38					312	8.6	6-20			A	me/coSa-SaLm	so;R
Newcastle Av25, Avalon Av26	500 - 900	0			5	64	15	191	20	36			291	8	10-20		10-30	B	coSaLm-SaClLm	sp
Sebakwe Cv22, Chester Hu22	800 - 1200	−0	5	18	10	128	10	128	8	15			289	7.9	0-6		0-6	B	coSa-LmSa	so;R
Swartland Sw31, Hogsback Sw32	300 - 450	0	5	18	10	128	7	89	4	7			242	6.6	15-30		35-55+	B	ClLm-Cl	vp
Kosi We20, Devon We22 Langkuil We30	300 - 600	0							5	9	40	219	228	6.2	5-10		6-20	B	me/coSa-SaLm	sp
Dundee Du10, Jozini Oa36	500 - 1200	0									30	164	164	4.5	6-15		10-20	A	fi/meSa-SaLm	so;R
Msinga Hu26	800 - 1200	+0	25	91	5	64							155	4.2	10-20		15-35	B	meSaLm-SaClLm	so;R
Klipfontein Ms11 Bontberg Hu25	150 - 350	3	20	73	5	64							137	3.8	6-10		6-15	A	me/coSaLm	hp;R
Hermanus Pn22	400 - 800	0			5	64	5	64	3	5			133	3.6	0-6		0-6	B	coSa-LmSa	gc

Terrain type/ *Terreintipe* : A3
Terrain form sketch/ *Terreinvormskets*



For an explanation of this table consult LAND TYPE INVENTORY (table of contents)
Ter verduideliking van hierdie tabel kyk LANDTIPE-INVENTARIS (inhoudsopgawe)

Geology : Mainly granite and deposits of the weathering products of granite of the Kuils River-Helderberg Pluton, Cape Granite Suite; occasional Quaternary quartz sand of the Springfontyn Formation and alluvium.

Geologie: *Hoofsaaklik graniet en afsettingsprodukte van verweerde graniet van die Pluton Kuilsrivier-Helderberg, Granietsuite Kaap; plek-plek Kwaternêre kwartssand van die Springfontyn Formasie en alluvium.*