APPENDIX 28

AGRO-ECOSYSTEM IMPACT ASSESSMENT REPORT

NOVEMBER 2024

Scoping & EIA

Cape Winelands Airport

Agricultural Agro-Ecosystem Assessment

FINAL

August 2024

Report compiled for

PHS CONSULTING

AGRI informatics NATURAL RESOURCE SPECIALISTS

Site Sensitivity Verification and **Agricultural Agro-Ecosystem Specialist Assessment** for the proposed **Cape Winelands Airport Development** on **Remainder and Portion 4 of Farm 474, Paarl RD; Remainder and Portions 10 & 23 of Farm 724, Paarl RD; and Portion 7 of Farm 942, Malmesbury RD** 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: **29 August 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.

____________________________ **29 August 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 Agro-Ecosystem Specialist Assessment (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 2
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 Agro-Ecosystem Specialist Assessment

Requirement	Report Reference
Indicate the extent of the impact of the proposed development on the agricultural resources	Para. 5.3
Indicate whether or not, the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event that it does, whether such an impact is outweighed by the positive impact of the proposed development on agricultural resources.	Para. 5.4.1
Provide a description of the status quo, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:	
Soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope;	Para. 5.2.1 & 5.2.3
The vegetation composition, available water sources as well as agro-climatic information;	Para. 5.2.2
The current productivity of the land, based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;	Para. 5.2.6
The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure; and	Para. 5.2.7
Existing impacts on the site, located on a map (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).	Para. 5.2.8
Assessment of the change in productivity for all agricultural activities, based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;	Para. 5.3.2
Assessment of the change in employment figures (both permanent and casual) for the past 5 years, expressed as an annual figure;	Para. 5.3.3
Indication of any alternative development footprints within the preferred site which would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.	Para. 5.3.6
The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	Para. 5.1.1
A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant.	Para. 5.1.2
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. 3.3
An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development.	Para. 5.3.3
An indication of the possible long-term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land	Para. 5.3.4
Additional environmental impacts expected from the proposed development based on the current status quo of the land, including erosion, alien vegetation, waste, etc.	Para. 5.3.5
Information on the current agricultural activities being undertaken on adjacent land parcels.	Para. 5.2.9
A motivation must be provided if there where alternative development footprints identified as having a "low" or "medium" sensitivity and that where not considered appropriate.	Para. 5.3.6
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. 5.3.7

Requirement	Report Reference
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
Calculations of the physical development footprint area of each land parcel as well as the total physical development footprint area of the proposed development (including supporting infrastructure).	N/A

Contents

1. Introduction

Cape Winelands Airport Company Limited is the proponent for the development of the **Cape Winelands Airport** (CWA) on the former Fisantekraal Airport land approximately 10 km northeast of Durbanville, between the R302 and R304, north of the R312 within in the City of Cape Town metropolitan area (Figure 1). The development will include *inter alia* the construction of a runway of 3500 m to accommodate aircraft up to Boeing 747-440 and Airbus A380 classes.

The former Fisantekraal airport is situated on two land portions, zoned as “Transport 1” with consent to be used as an airport. To accommodate the lengthened runway and the proposed new airport infrastructure and facilities, additional land is required. Four land portions, zoned as “Agriculture” have been identified. Two (RE/724 and 23/724) will be fully incorporated, while only parts of the other two (RE/474 and 7/942) will be required.

An Agro-Ecosystem Assessment is required for both (i) the rezoning of the agricultural land and (ii) as part of the Scoping & EIA process for the new airport. This document reports on the findings of the Agricultural Agro-Ecosystem Specialist Assessment.

2. Terms of Reference

Agri Informatics was contracted by PHS Consulting on behalf of the applicant Cape Winelands Airport Company Limited, to conduct an Agricultural Agro-Ecosystem Specialist Assessment on the properties and sites identified for the new CWA facility.

The assessment had to include:

- Assessment of the soils based on the Land Type dataset, supported by a reconnaissance scale soil survey
- Climate analysis
- Summary of available water sources (ground water, surface water and scheme water for irrigation and/or livestock)
- Topography/surface hydrology and impact on agricultural activities
- Current and historic agricultural activities
- Compilation of an agricultural land use map, including cultivated fields, natural veld, sensitive agricultural infrastructure such as contour banks and waterways
- Existing carrying capacity derived from general grazing capacity norms for the site
- Assessment of the agricultural potential of the properties, as determined by the availability and condition of the resources
- Agricultural use after the airport development
- Description of potential impacts of the proposed airport on the agricultural resources and activities
- Report that meets the minimum NEMA reporting protocol requirements for an Agricultural Agro-Ecosystem Specialist Assessment.

3. The Study Area

3.1 Locality

The study area is situated 10 km northeast of Durbanville in *the Western Cape (Figure 1) and consists of 6 farm portions, spanning an area of ±892 ha as shown in Figure* 2. The target properties are listed in Table 1.

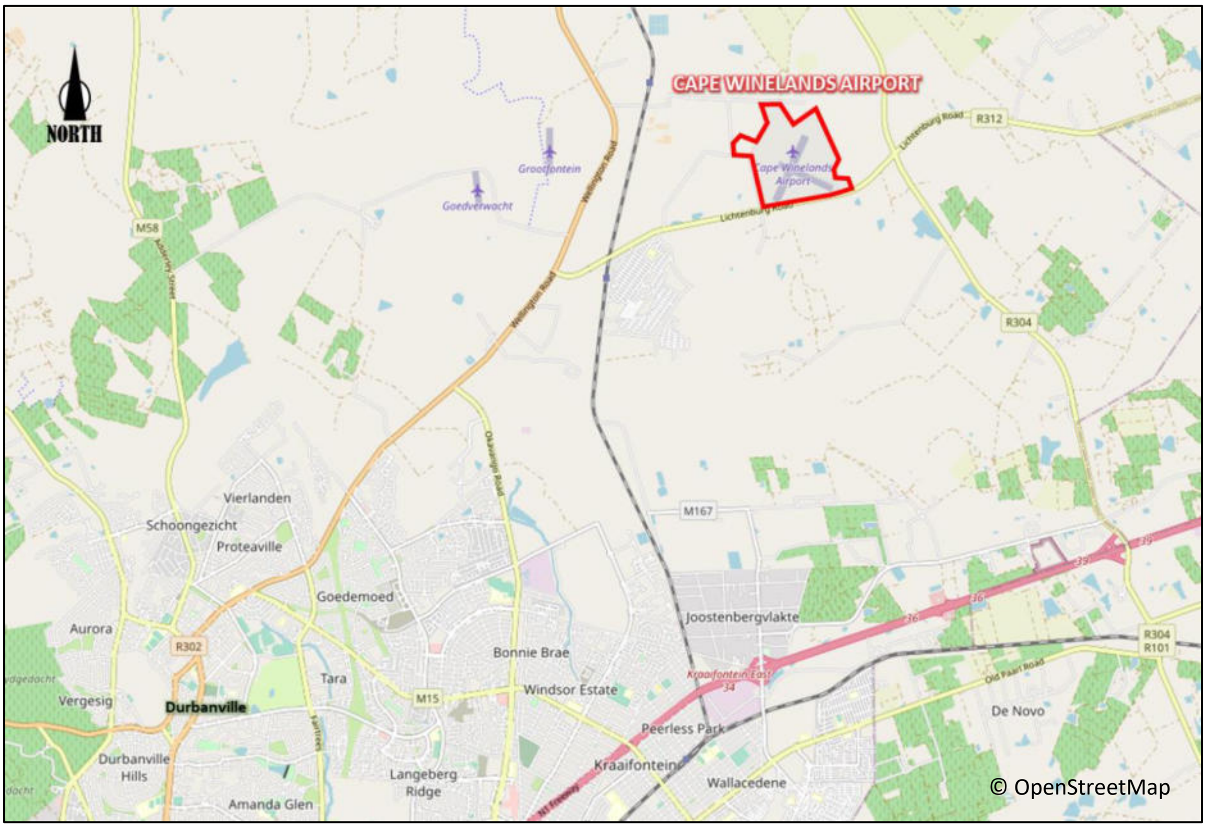


Figure 1: Cape Winelands Airport is located 10 km northeast of Durbanville.

3.2 Land Portions

Table 1: Cadastral units (properties) of the study area.

ID	Portion Nr	Farm Nr	Farm Name	District	Zoning	Area (ha)
1	Portion 4	474	Joostenbergs Kloof	Paarl RD	Transport 1	44.0442
2	Portion 10	724	Joostenbergs Vlakte	Paarl RD	Transport 1	113.9660
3	Remainder	724	Joostenbergs Vlakte	Paarl RD	Agriculture	42.3384
4	Portion 23	724	Joostenbergs Vlakte	Paarl RD	Agriculture	31.1740
5	Remainder	474	Joostenbergs Kloof	Paarl RD	Agriculture	402.3980
6	Portion 7	942	Kliprug	Malmesbury RD	Agriculture	258.5374
Total area of cadastral units						**892.4580**
Total area as per GIS data						*886.9710*

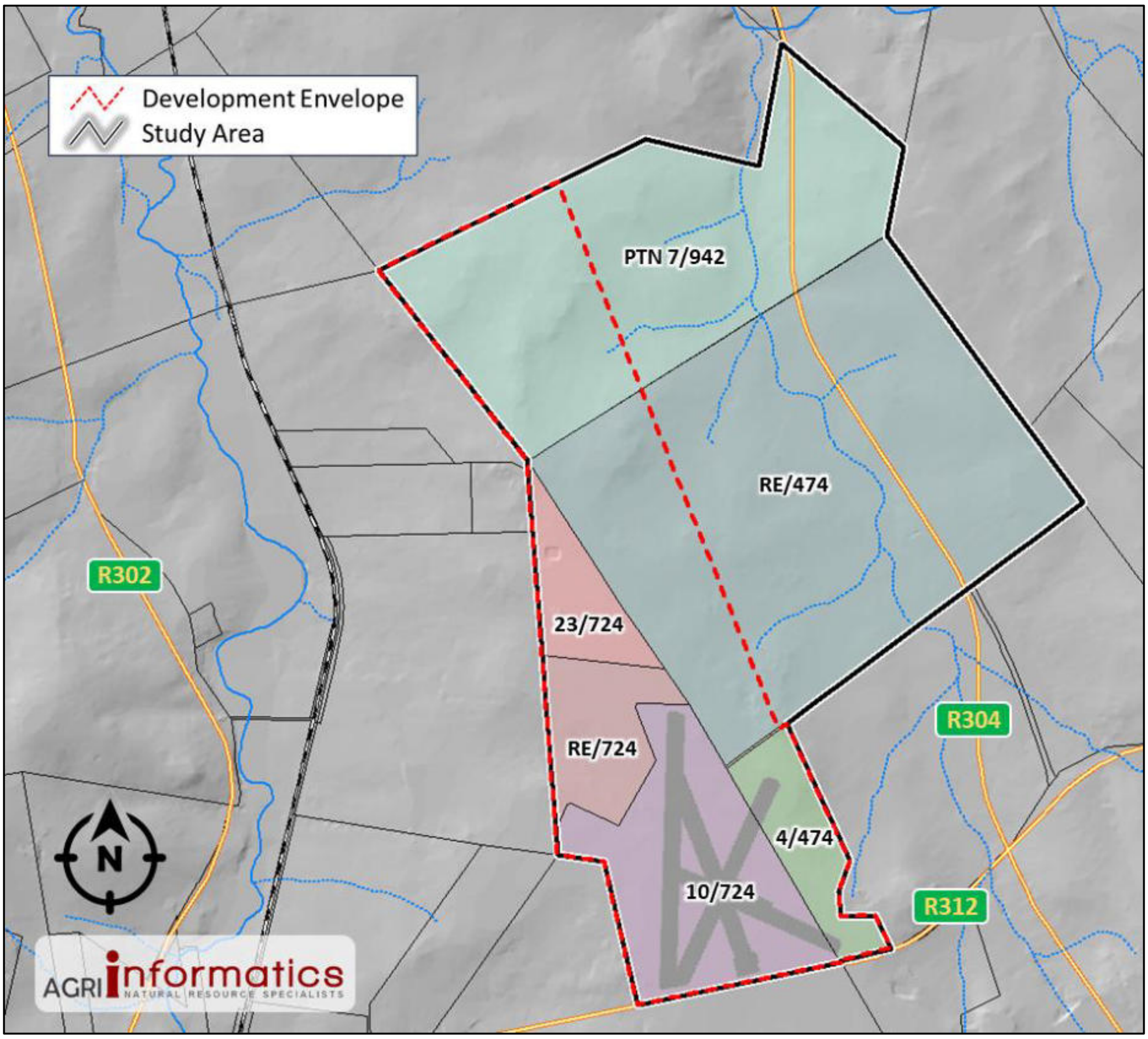


Figure 2: The land portions of the study area.

3.3 Development Footprint

The proposed development envelope, as indicated in Figure 3, spans an area of ±423 ha of which 158 ha (±37%) are already zoned for airport use (Transport 1).

4. Site Sensitivity Verification

The National Web based Environmental Screening Tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity. It *inter alia* identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

The web-based Environmental Screening Tool of the Department of Forestry, Fisheries and Environment (DFFE), indicates areas of **High** and **Medium** agricultural sensitivity within the study area (Figure 4). All abutting land is also indicated as either High or Medium sensitivity.

Figure 3: The Cape Winelands Airport Development will be contained within the area demarcated by the red broken line.

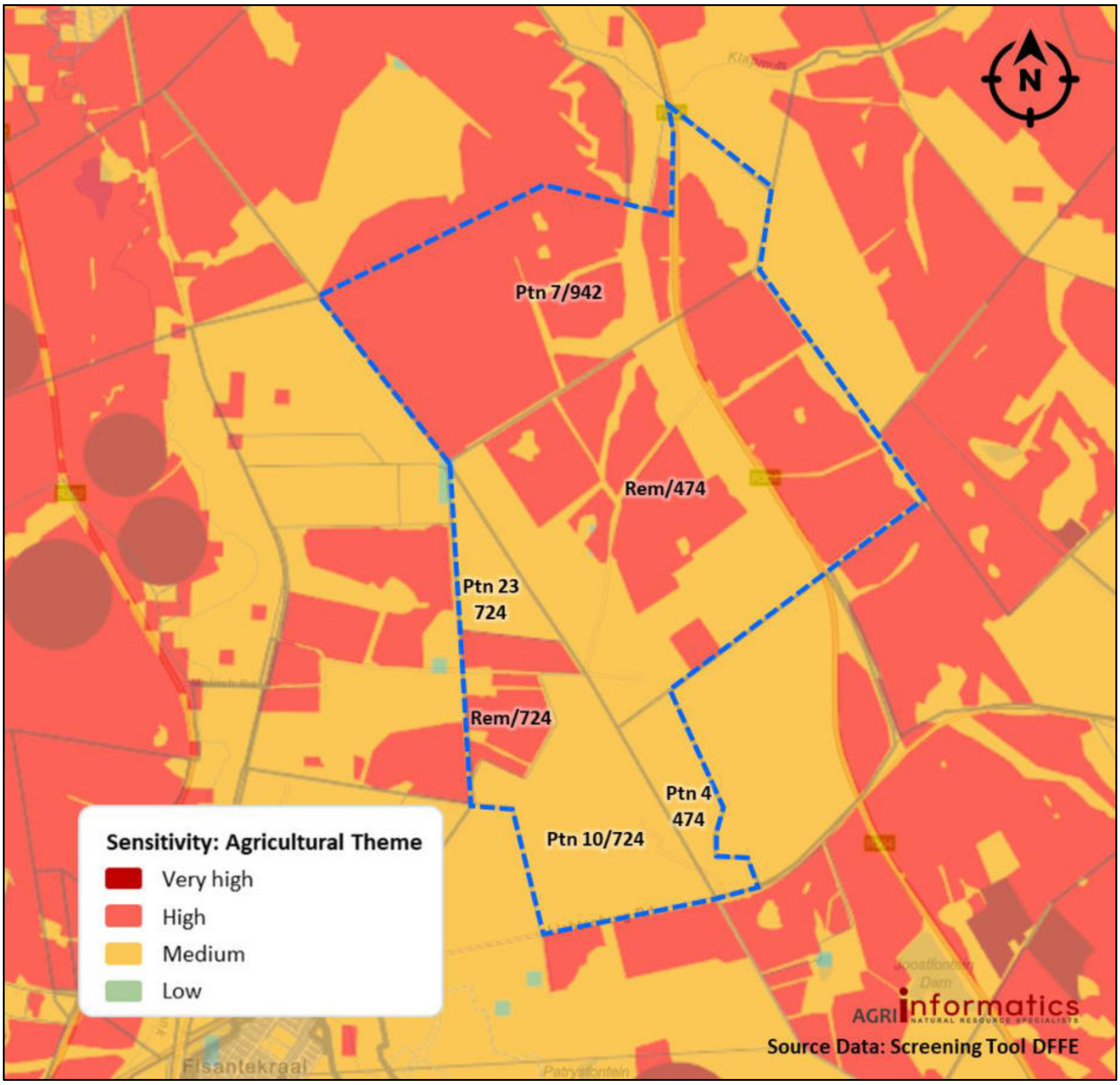


Figure 4: Sensitivity of the study area for the transformation of land from agriculture to the development of alternative facilities, including rezoning of agricultural land (Screening Tool: Department of Forestry, Fisheries and the Environment).

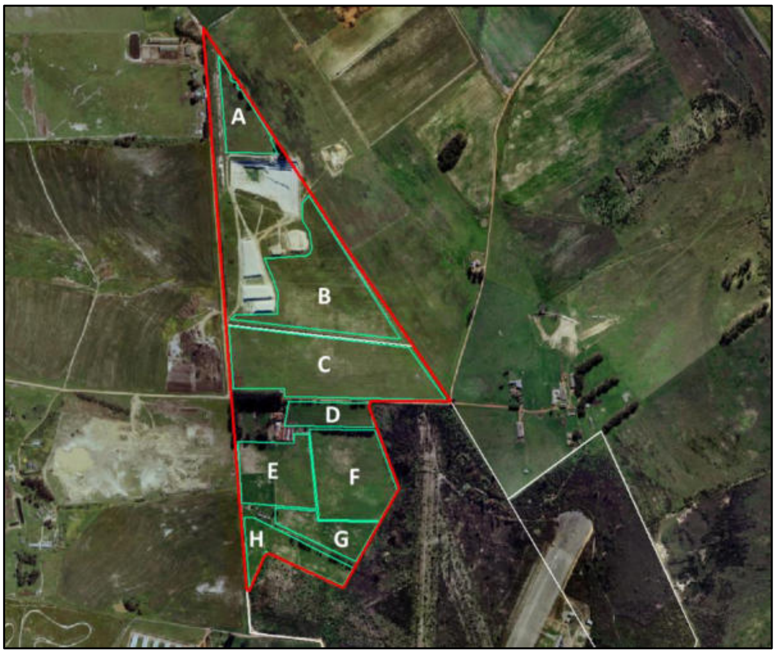
4.1 Desktop Assessment

4.1.1 Satellite Imagery

The Screening Tool of the Department of Forestry, Fisheries and the Environment indicates sections of high sensitivity in the study area (Figure 4).

The findings of this study are mostly in agreement with the assessment of the Screening Tool, except for Remainder of farm 724. For this farm portion the areas indicated as being of “high sensitivity” stems from areas mapped as “planted pastures” or “canola fields” in the Crop Census of 2013. While this census was largely done by supervised aerial photo and/or satellite image interpretation, an assessment of historic aerial imagery reveals that no cultivation was conducted during the past 10 years. In the discussion below, the cultivation history of each of the numbered fields of Rem 724 (Figure 4) are further deliberated and effectively shows that only ±10 hectare has been used productively for crop production, while a further ±25 hectare has been used for planted pastures, during the past ±20 years.

It is therefore suggested that "high sensitivity" areas effectively only occur on Remainder of Farm 474 and Ptn 7 of Farm 942. Parts of both these portions are included in the proposed development envelope.



Numbered fields of Ptn23 and Rem of 724.

Fields A and B

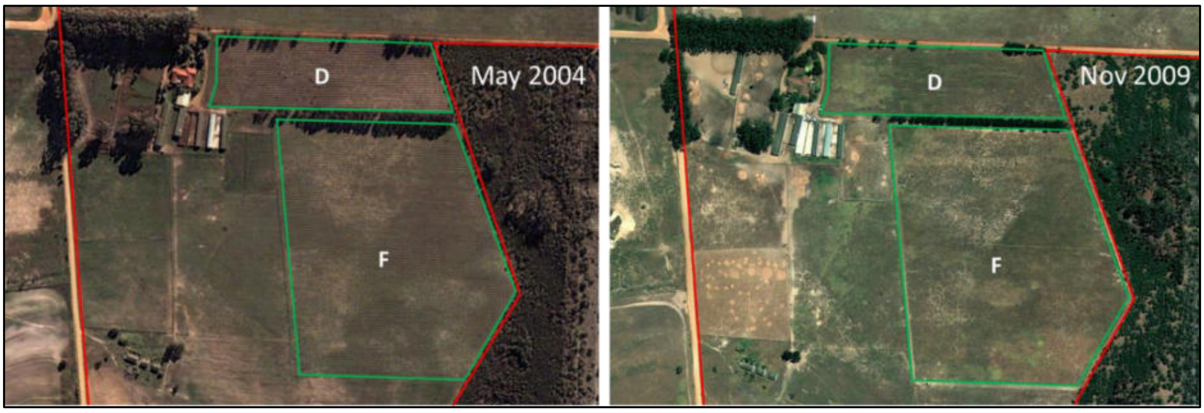
The areas around the clay quarry on Portion 23 of Farm 724 showed some linear activity circa 2004, expected to be related to brush cutting, as it does not correspond with cultivated fields on neighbouring farms (marked "X").

Field C

Similar linear activity is visible at Field C, but also without clear indication of any crop production during the past 18 years. Waterlogged areas and a drainage furrow are clearly visible in the 2009 image, below. This field is used for grazing of cattle and horse keeping in the recent past.

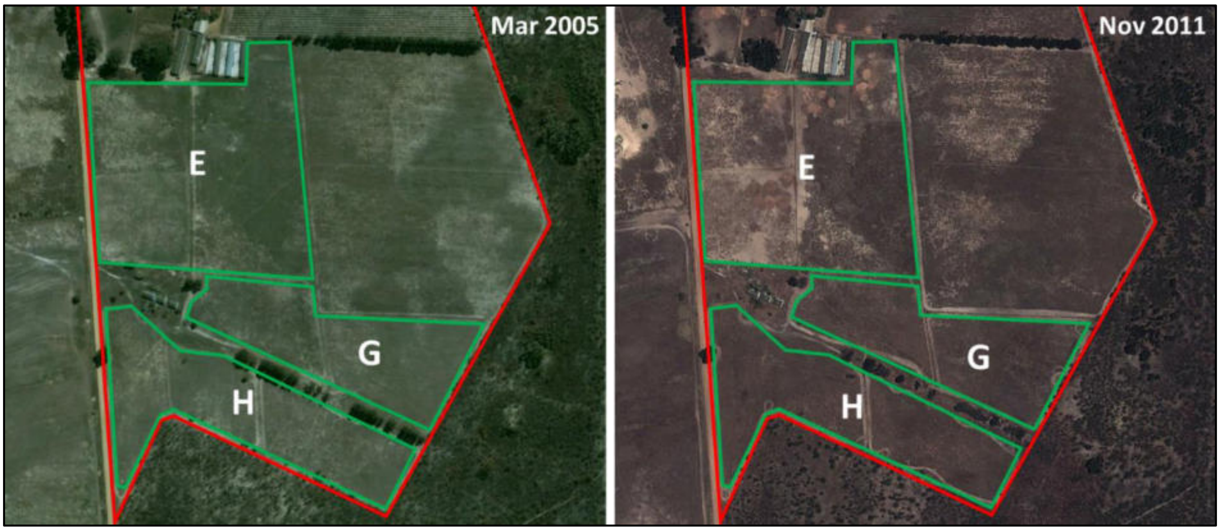
Fields D and F

These are two earlier wine grape blocks. Production on Block D persisted until *circa* 2009, while production on Block F was terminated around 2005.



Fields E, G and H

These fields have only been used for grazing and as paddocks in the past 10 years.



4.1.2 Land Use

a. Regional

The study area is situated in the southeastern corner of the Homogeneous Farming Area (HFA) known as the "High Rainfall Sowing Area" of the Swartland, as defined by the Provincial Department of Agriculture. Where the soils and slopes permit, the natural vegetation has been removed to make way for dry land small grain production, leading to a landscape almost fully converted to agriculture. The main agricultural activity is small grain production in combination with sheep and/or cattle farming.

Due to the limited supply of irrigation water there is no irrigated cultivation in the study area. The nearest irrigation is ±2 km to the west along the Mosselbank River, where grey water is sourced from the Fisantekraal treatment works near Mellish station. Other farming activities in the vicinity includes Braam's feedlot and County Fair chicken farms.

b. Study Area

A land use map (Figure 5) has been compiled from recent aerial imagery (Google Earth, 2024) and personal ground observations, to determine the extent of the cultivated areas and other features within the study area. Table 2, provides a summary of the areas of each land use category within the development area and the areas retained as Agriculture 1.

Table 2: Areas per land use category.

Land use category	Area (ha)
Airport Precinct	8.8
Airport_Zoned	101.6
Clay Quarry	3.9
Cultivated fields	575.0
Dam	0.7
Dam wall	0.5
Drainage areas	14.0
Eucalyptus plantation	1.4
Fall-Out Land	12.9
Fallow Land	52.0
Fallow/Grazing	36.2
Farmhouses	3.5
Farm road	1.5
Farm sheds	2.4
Gas facility	0.1
Horse Camps	19.0
Public road	3.0
Road primary	4.9
Rocky outcrops	6.7
Runways	38.7
Total	**886.8**

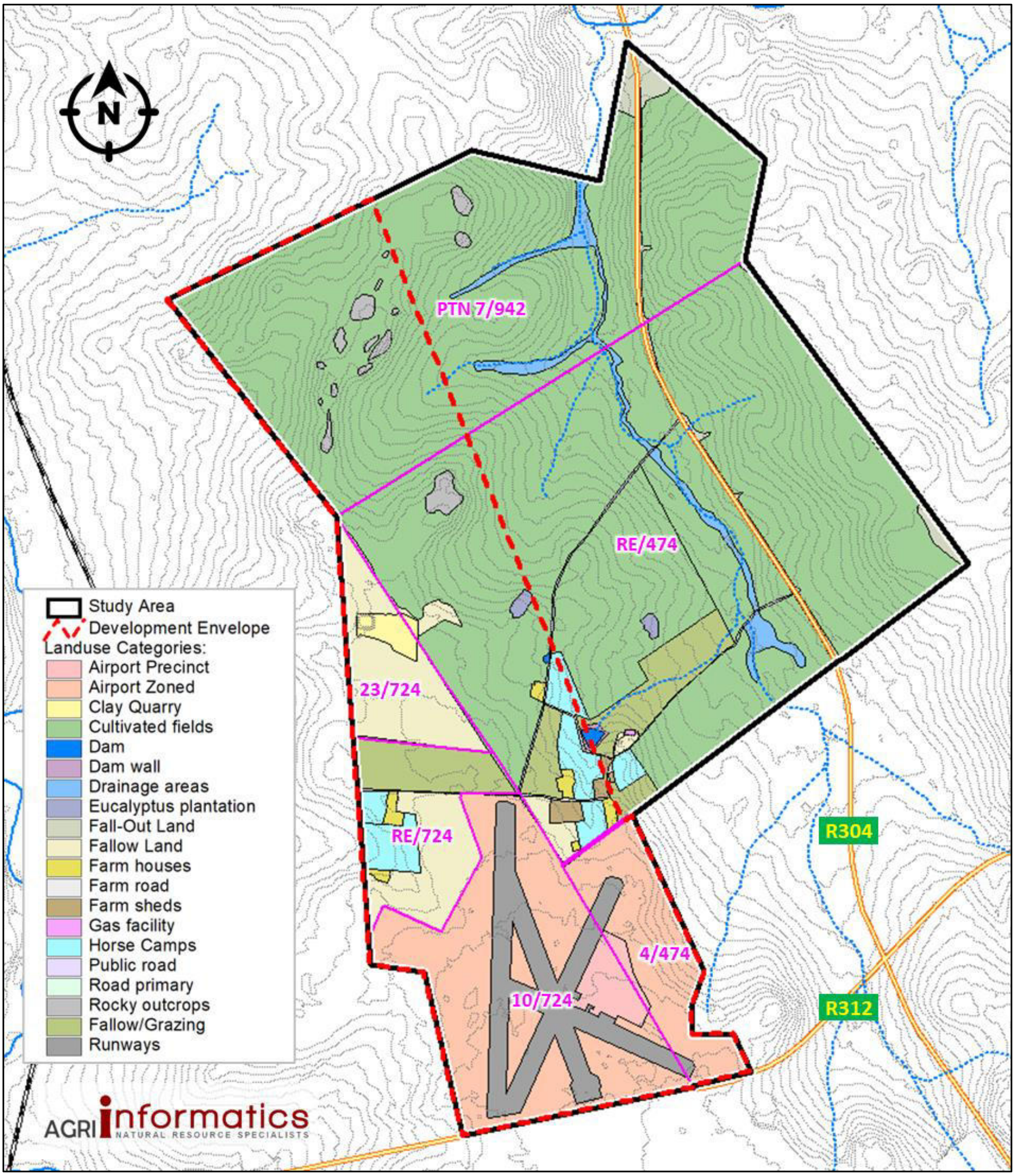


Figure 5: Land use map of the study area (contours at 2 m intervals).

Ptn 10/724 & Ptn 4/474 – Transport Zoned (Current CWA land)

No agricultural activity

Ptn 23/724 – Clay quarry land

No agricultural activity

Rem/724

Land essentially only used for paddocks for horses.

Rem 474 & Ptn 7/942

The main agricultural activity in the study area is the production of small grain in combination with sheep and cattle on these two land portions. About 12 ha of Rem/474 have been arranged into horse paddocks.

4.1.3 Terrain & Hydrology

The topography of the study area was derived and analysed, making use of (i) 2 m contour lines (CoCT) and 5-meter contour data (NGI) from which digital elevation models was constructed at grid sizes of 5 m (for the study area) and 10 m for the regional analysis. The 5-meter DEM was used to conduct a slope gradient analysis and assessment of the surface hydrology.

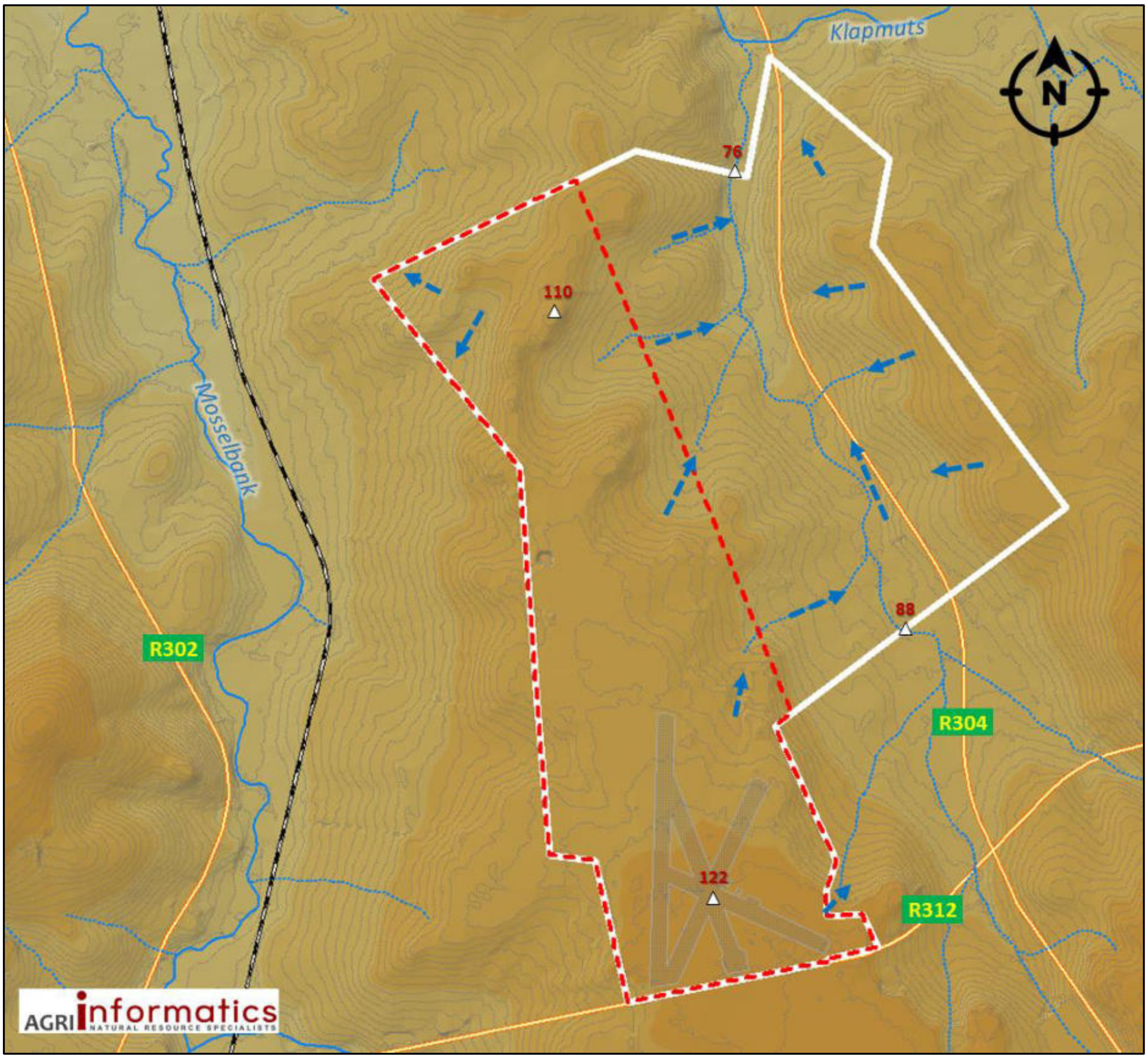


Figure 6: Relief and surface hydrology of the study area (contours at 2 m intervals).

The elevation of the study area varies between 76 m amsl and 122 m amsl, the latter being the elevation at the current airport. Small sections along the western boundary drains westward toward the Mosselbank River, while the bulk of the study area drains towards the northeast to flow into the Klapmuts River, a tributary of the Mosselbank River (Figure 6).

The slope gradient map (Figure 7) shows the areas included in the proposed development area being very flat in the southern section but gradually increases in slope gradients towards the north. The flat areas are situated on a crest (Terrain Unit 1), which transitions to the mid-slopes towards the steeper areas in the north (Terrain Unit 3).

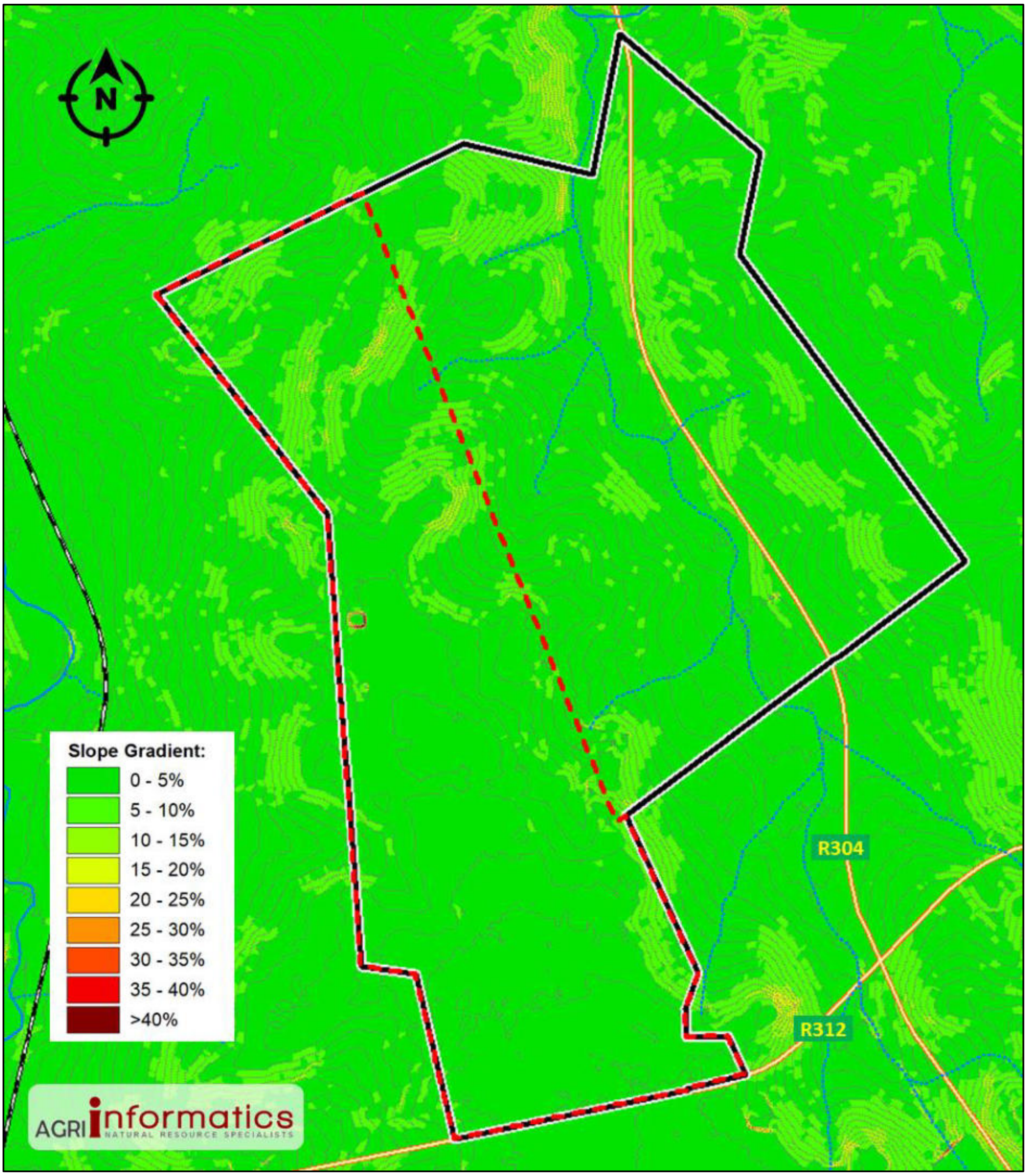


Figure 7: Slope gradient map of the study area (contours at 2 m intervals).

4.1.4 Agro-Climatology

a. Köppen-Geiger

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.

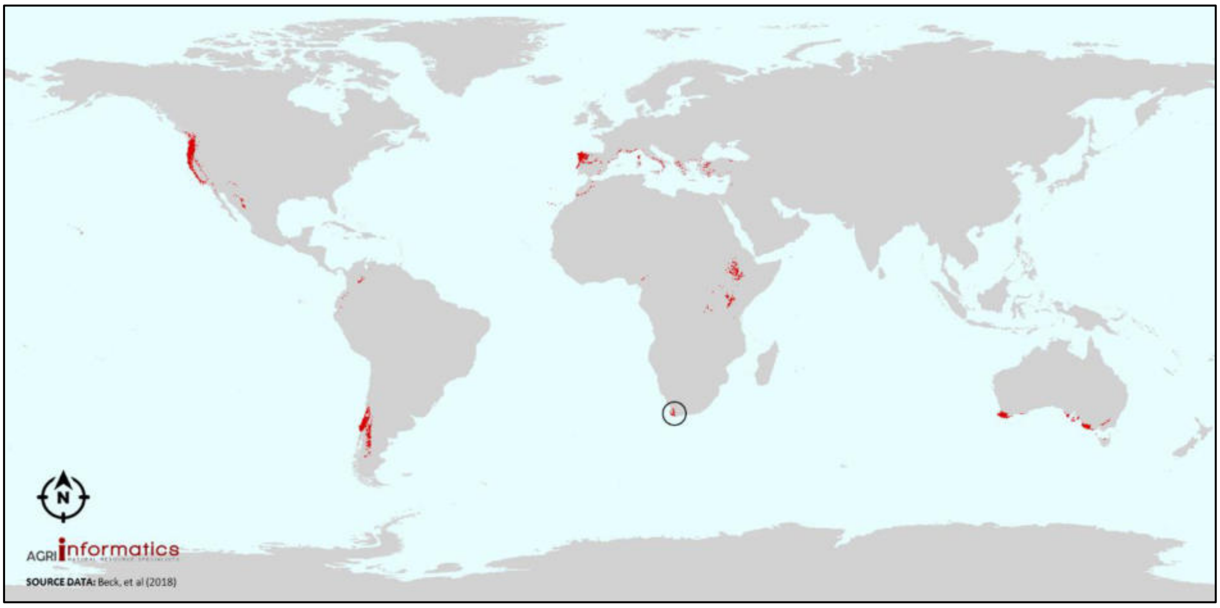


Figure 8: Köppen-Geiger Csb climate zones of the world (Data source: Beck, et al, 2018).

b. Climate parameters

At an elevation of only ±120 m amsl and about 25 km from the Atlantic coastline the climate is marginally maritime, i.e. mean temperature difference between hottest and coldest month is <10°C. The average annual rainfall is 532 mm, of which only 94 mm (<20%) is summer rain between October to March. The annual reference crop evaporation (FAO Penman-Monteith) amounts to 1178 mm per annum, 818 mm during the summer months. This rainfall deficit in summer implies that, for most perennial tree crops, irrigation of at least 5000 m³/ha will be required during summer. Wine grapes will require ±3000 m³/ha. The rainfall during winter 438 mm is regarded as adequate for dry land (non-irrigated) winter cereal production, provided that the soil properties are sufficient to retain groundwater between rainfall events.

The warmest months are January and February with average maximum temperatures of 27.0°C and 28.1°C respectively. The coldest month is July with an average minimum temperature of 7.1°C. Temperatures rarely go below freezing, resulting in a frost-free region. The highest wind incidence is in December and January, whilst the average annual windspeed is high at 6.5 m/s (WASA, 2020). The positive chill units, calculated by the Linsey-Noakes model are 742 degree-hours (Schulze, 2009).

Table 3: Summary of key climate parameters of the study area.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg. Temperature °C	20.9	21.7	20.2	17.6	14.7	12.8	11.7	12.0	13.2	15.8	18.1	19.5	
Min. Temperature °C	14.8	15.2	13.9	11.7	9.9	8.5	7.1	7.2	8.1	10.0	12.0	13.6	
Max. Temperature °C	27.0	28.1	26.5	23.4	19.4	17.1	16.3	16.7	18.3	21.5	24.2	25.3	
Rainfall mm (in)	10	8	14	40	78	100	90	83	47	33	17	11	532
Humidity(%)	57%	58%	59%	64%	72%	76%	76%	78%	75%	68%	62%	58%	
avg. Sun hours (h/d)	11.0	10.3	9.4	8.1	6.6	6.2	6.4	6.2	7.2	9.0	10.0	11.0	
Evaporation (mm)	158	136	119	83	57	42	45	57	76	113	138	155	1178

4.1.5 Geology and Soils Information

The geology of the study area is mainly surficial cover formed in situ on Malmesbury rocks as well as greywacke, phyllite, and quartzitic sandstone of the Tygerberg Formation, Malmesbury Group. Ferricrete occurs occasionally. The presence of localised granite was also observed during the soil survey.

Figure 9 below, was compiled from the Land Type Map of South Africa (Land Type Survey Staff, 1972-2006). For practical purposes the entire study area is situated within Land Type Db 41. In these soils a prismacutanic, pedocutanic and/or gleycutanic diagnostic horizon is dominant and the B horizons are normally non-red. These are soils where the non-red B-horizon (subsoil) has a strongly to very strongly developed structure, usually also with a high clay content. The soil is thus mostly imperfectly to poorly drained and the strong structure in the subsoil places a restriction on root development. Due to the fact that most of these soils have a sandier topsoil on a clay subsoil, they are usually sensitive to erosion if poor management practices are applied, especially when the vegetation cover is removed through overgrazing of natural veld or by cultivation (Land Type memoirs).

The Land Type memoirs also provide information about the distribution of soil forms per terrain unit (Table 2), where the terrain units refer to 1: crest, 2: scarp (not present here), 3: mid slope, 4: foot slope and 5: valley bottom. Figure 5 below, shows the typical terrain form of Land Type Db41.

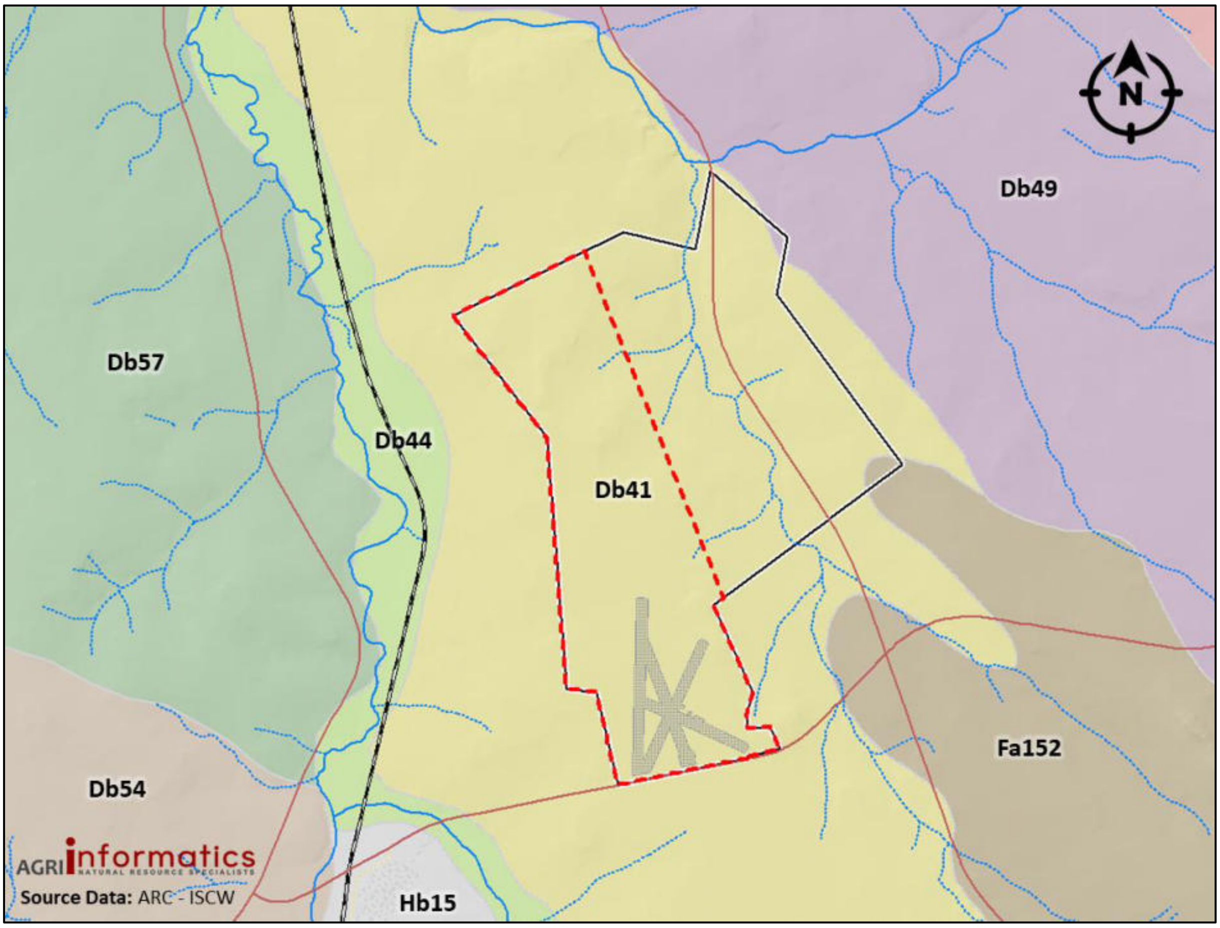
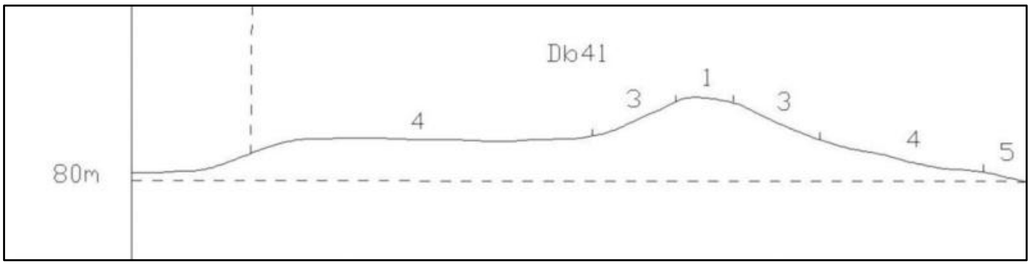


Figure 9: Land Types in the vicinity of the study area (Land Type Survey Staff, ISCW).

Table 4: An extract of the various soil forms associated with the different terrain units of Land Type Db 41.

Soils per Terrain Unit											
1			3			4			5		
Soil Form	**%**	**Depth**	**Soil Form**	**%**	**Depth**	**Soil Form**	**%**	**Depth**	**Soil Form**	**%**	**Depth**
Rock	70		Es	25	300-600	Es	24	300-600	Es	60	300-600
Gs	15	300-500	Kd	10	600-1200	Kd	31	600-1200	Ss / Kd	40	300-500
			Ss / Kd	20	300-500	Ss / Kd	20	300-500			
			Kd	15	600-1200	Wa	10	800-1200			
			Ms	5	<300	Kd	15	600-1200			
			Wa	5	300-500	Ms	5	<300			
			Gs	5	300-500	Fw	4	900-1200			
			Cv	10	600-900	Wa	2	300-500			
			Sw/Ss	5	300-500						



Terrain form sketch of Land Type Db 41.

4.1.6 Irrigation

No crops are being irrigated in the study area.

4.2 Site Visit

A total of five site visits were conducted between January and May of 2022. Observations of the agricultural activities, soil properties and general farm infrastructure were made and the results are presented in the various sections of this report, including the photographs on the following pages, which provide a visual overview of the activities and character of the farm land in the study area.

Photo set 1
Typical agricultural scenery in the study area

Old clay quarry on Ptn 23/724

Stables and old workers cottages on Rem 724

Horses on Rem 724

Cattle on Rem 724 & Ptn 7/942

Horse paddocks on Rem 724 & Ptn 7/942

Rocky outcrop (foreground) in fields prepared for sowing a winter crop on Rem 724 & Ptn 7/942

Sandy topsoil on Rem 724 & Ptn 7/942

Gravelly topsoil on Rem 724 & Ptn 7/942

4.3 Resulting Agricultural Sensitivity

Agro-ecosystem sensitivity is related to the intensity of current or viable farming activities, which in turn is related to the agricultural potential. It therefore follows that the agro-ecosystem sensitivity of an extensive farming area with low agricultural potential will be low, while the environmental sensitivity could be high. Very High and High agro-ecosystem sensitivity will thus be related to areas of high agricultural potential and/or intensive farming activities, such as irrigated cultivation.

The desktop assessment and the site visit confirmed the presence of extensive cultivated annual crop production (winter cereals) on parts of the proposed development area and thus by definition, confirms the classification of “High” agricultural sensitivity, as proposed by the Screening Tool. Non-cultivated fallow land or fields used for grazing have also been confirmed and would be classified as as of “Medium” or “Low” agricultural sensitivity.

The presence of areas of High sensitivity confirms the need for an Agricultural Agro-Ecosystem Specialist Assessment, as prescribed by the NEMA protocol.

5. Agricultural Agro-Ecosystem Assessment

Subsequent to the findings of the Site Sensitivity Verification, the following facts are presented in fulfillment of the minimum reporting requirements for Agricultural Agro-Ecosystem Assessments (as per Government Notice 320, published in the Government Gazette 43110, dated 20 March 2020). Soil information was extracted from the South African Land Type Dataset, as obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) and from a reconnaissance scale soil survey, focused on the areas to be extracted from Agriculture.

5.1 Site Inspection

5.1.1 Relevance

[State the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment]

The site inspections were conducted during the summer and autumn of 2022. This was prior to the annual planting season for small grains, but provided a clear picture of the limited grazing capacity during the late summer, typical of the grain areas of the Swartland. Despite being somewhat out of season, the timing of the site visits did not have any negative impact on the outcome of the assessment.

5.1.2 Methodology

[Provide a description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant.]

Observations made during the site visit included:

- Verification of features mapped from satellite imagery;
- General observations of agricultural activities and practices, including photographic evidence;
- Soil observations from soil profiles exposed by profile pits made with a TLB (digger-loader) during the first site visit and expanded by the observations of soil profiles and soil cores obtained with a hand soil auger, during the second site visit. The soils were classified according to the South African Taxonomic soil classification system.

5.1.3 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.]

The agricultural sensitivity as presented by the Screening Tool (DFFE) indicates areas of “High” and other areas of “Medium” sensitivity. The areas of “High” sensitivity in the northern part of the development envelope (marked “A” in Figure 10) corresponds to annual dryland cultivated fields, while the areas in the eastern part (marked “B” in Figure 10) correspond to horse paddocks of which parts were previously used for wine grape production, but the last vineyards have been uprooted more than 10 years ago.

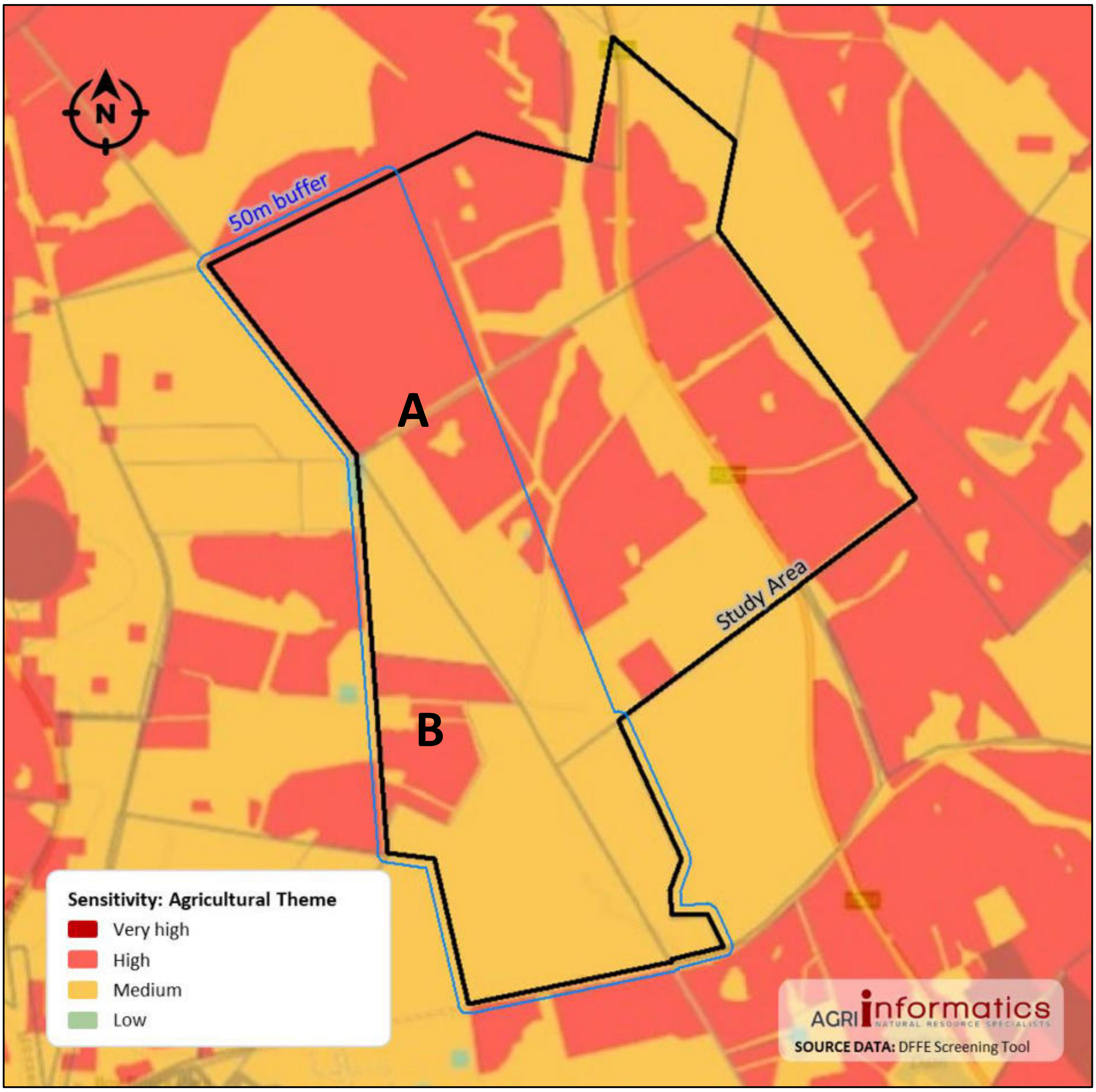


Figure 10: Agricultural Sensitivity as indicated by the Screening Tool of DFFE. A buffer of 50 m around the development footprint is indicated by the blue line.

5.2 Agro-Ecosystem Baseline

[Include a description of the status quo, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:]

5.2.1 Soils of the Study Area

[The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage.]

The following soil properties (Table 5 and Figure 11) were observed during the soil survey that was carried out. Also see photographs of profile pits in Annexure.

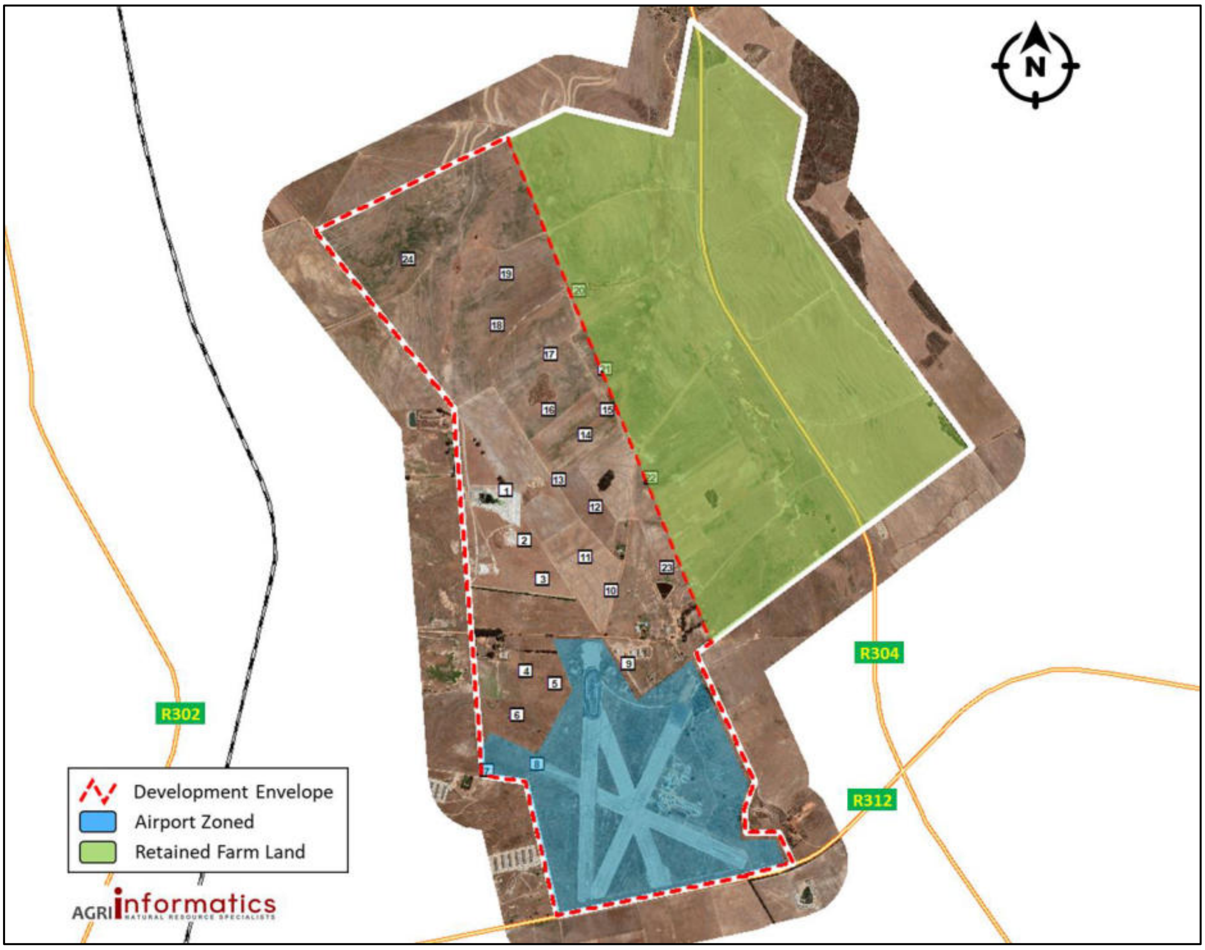


Figure 11: Soil profile pit positions used during the soil survey. The focus of the survey was on the land to be converted from Agriculture to Airport use.

The reconnaissance soil survey that was conducted as part of this study, are in agreement with the Land Type information. Prismacutanic, pedocutanic and/or gleycutanic diagnostic horizons are dominant in large sections of the study area, with deep bleached or marginally yellow apedal sand also common in places. The map in Figure 11 shows the distribution of profile pits that were made during the survey, with the assistance of a TLB (digger-loader). A photo collage of the soil profiles is presented in the appendix, while the main soil properties are presented in Table 5. The soil properties with respect to effective depth, clay content, porosity, permeability, water retention capacity and general morphological characteristics were interpreted to derive an indication of the soil suitability for the production of crops under dryland (rainfed winter cereal) or irrigated (perennial fruit) conditions.

Table 5: Summary of the soil properties of the assessed profiles.

Profile	Soil Form	Depth (cm)	Soil Suitability		Remarks
			Dryland	Irrigated	
1	Wa	30	Low	Very low	Deep clay deposit as C-Horizon
2	Wa	40	Low	Very Low	Deep clay deposit as C-Horizon
3	Wa	70	Medium	Low	Cemented E-horizon
4	Ct	90	Medium	Low	Gravelly (Fe-concretions) in B. Redox mottling in C-Horizon
5	Ct	60	Med low	Low	Redox mottling in C-Horizon (clay)

Profile	Soil Form	Depth (cm)	Soil Suitability		Remarks
			Dryland	Irrigated	
6	Fw	120+	Medium	Med low	Low water retention capacity
7	Fw	120+	Medium	Med low	Low water retention capacity
8	Oa	120	Med high	Medium	
9	Ct	120+	Med high	Medium	Fine gravel in subsoil & sandy topsoil
10	Es	50	Med high	Medium	Shallow sandy topsoil
11	Es	70	Med high	Med low	High gravel content (Fe-concretions) in E-horizon
12	Es	70	Med high	Med low	High gravel content (Fe-concretions) in E-horizon
13	Vf	70	Medium	Med low	Very hard/compacted subsoil
14	Cv	150	Med high	Medium	Moderate water retention capacity (Water table at 150 cm)
15	Es	60	Medium	Med low	Prismacutanic layer at 70-100 cm
16	Es	90	Med high	Med low	Hard/compacted subsoil
17	Es	70	Med high	Med low	Weathered (soft) shale in subsoil
18	Ct	60	Medium	Med low	C-material prismacutanic
19	Es	45	Med low	Low	Gleyed C-material
20	Es	55	Medium	Med low	Mod hard prismacutanic B transition to shale saprolite
21	Es	70	Med high	Medium	Hard well-developed prisms
22	Es	40	Med low	Low	Deep dense clay in subsoil
23	Lo	50	Med high	Medium	Soft plinthite transition to dense clay
24	Rock				Scattered rocky outcrops

5.2.2 Vegetation and Grazing Capacity

[Where applicable, provide a description of the vegetation composition.]

Livestock, mainly sheep farming, is an important agricultural activity in the traditional wheat regions of the Western Cape and also in the High Rainfall Sowing homogeneous farming area (HFA). It is accommodated in a crop rotation system with wheat as cash crop and oats, barley or triticale used as pastures or cut for silage and fodder. Medics or lupins – depending on soil types - are also often incorporated in the crop rotation. A general ratio of 60:40 between cash crops and pastures/fallow land are mostly used in this area. The grain stubble, plant rests and volunteer growth also provide important grazing for sheep in this system. A grazing capacity of 0.85 to 1.72 ewes/ha without supplementary feeding and 2.0 to 2.5 ewes/ha with supplementary feeding is proposed by Van Heerden & Ferreira (2008). Due to the low summer rainfall the availability of fodder during late summer and fall is very low and supplementary feeding is normally provided and often limits the feasible stock numbers on a farm during this period.

A dual-purpose sheep ewe account for 0.17 Large Stock Units (LSU's), while a medium frame beef cow is calculated as 1.21 LSU's (CARA, 2001). Thus, the grazing capacity of a medics/grain stubble system without supplementary feeding would imply ±6.2 ha per medium frame cow. At these grazing capacities an estimated 740 small stock units or about 100 large stock units can theoretically be accommodated on the 575 ha cultivated fields of Rem 474 and Ptn 7/942, being the only cultivated fields in the entire study area.

All earlier natural vegetation within the parts of the study area, zoned for agriculture, has been converted to cultivated fields decades ago. Therefore, the study area does not offer any grazing opportunity on natural veld.

5.2.3 Terrain Description

[Provide a description of the terrain units and slopes.]

A slope gradient and aspect analysis are presented in paragraph 4.1.3.

5.2.4 Water Sources

[Provide a description of the water sources.]

The study area has very limited access to water that can be used for irrigation. The groundwater potential of most of the study area west of the R304 is low, at 0.5 – 2.0 liter/sec (1.8 – 7.2 m^3/h) and marginally higher east of the R304 at 2.0 – 5.0 liter/sec (7.2 – 18 m^3/h). The quality for irrigation purposes is poor with an electrical conductivity (EC) between 150 – 370 mS/m (DWS, 2012). The geohydrological study (GEOSS, 2022) conducted as part of the EIA, indicates EC values of 70 – 300 mS/m in the east and 300 – 1000 mS/m in the west. The tested yield of a borehole was 1.0 liter/sec, with an annual sustainable yield of 31 536 m^3/a, and will be required by the proposed development.

The land portions of the study area also have no access to any irrigation water from an irrigation scheme, while the potential to harvest surface water for irrigation purposes is also very limited.

5.2.5 Agro-climatology

[Provide a description of the agro-climate.]

See paragraph 4.1.4 above, for a description of the agro-climatology.

5.2.6 Current Productivity

[Describe the current productivity of the land, based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units.]

The only significant production in the study area, contributing to food security is the production of small grains (wheat, canola, medics rotation) in combination with beef cattle. The cultivation is normally done at 60:40 ratio between cash crops and pastures/fallow land. This implies than only ±345 ha (60%) of the cultivated fields (575 ha) is in production in any specific year. The beef cattle herd consist of ±110 cows.

The following production units and yields have been identified from the land use mapping and verification on site:

Table 6: Production figures for the identified production units.

Production Unit	Planted Area / Herd size	Average Annual Yield/ha	Total Yield
Cultivated dryland fields	330 ha	4.0 t/ha	1 380 t/a
Beef cattle	±110 cows		100 weaners

5.2.7 Current Employment

[Provide the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure.]

Annual man-hours required for field preparation, planting, crop maintenance, pest and weed control, and harvesting varies between 25 to 80 man-hours/ha for production of field crops in South Africa (Statistics South Africa, 2020) subject to the tillage practices, environmental factors and degree of mechanization. This converts to an average labour requirement of 1 labourer per 43 ha. The total current farming labour requirements of all farm units is calculated as follows:

Table 7: Summary of current farm worker employment opportunities.

<table>
<tr><th>Land Portion</th><th>Farming Activity</th><th>Area (ha)</th><th>Ha/labourer</th><th>Employment Opportunities</th></tr>
<tr><td>Ptn23/724</td><td>n/a (clay quarry)</td><td></td><td>---</td><td>Nil</td></tr>
<tr><td>RE/724</td><td>Horse keeping</td><td></td><td></td><td>2</td></tr>
<tr><td>10/724</td><td>Aerodrome</td><td></td><td>---</td><td>Nil</td></tr>
<tr><td>4/474</td><td>Aerodrome</td><td></td><td>---</td><td>Nil</td></tr>
<tr><td rowspan="3">RE/474
&
7/942</td><td>Grain production</td><td>575</td><td>43</td><td>13</td></tr>
<tr><td>Horse keeping</td><td></td><td></td><td>2</td></tr>
<tr><td>Livestock/stud</td><td></td><td></td><td>3</td></tr>
<tr><td colspan="4">Total employment opportunities</td><td>20</td></tr>
</table>

5.2.8 Existing Impacts

[Map existing impacts on the site, e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc..]

Minor gully erosion has been observed within the study area, as well as alien vegetation, mostly *Acacia saligna* (Port Jackson) within the present aerodrome precincts, but no non-agricultural infrastructure, waste or other factors have been observed. With some of the topsoil being very sandy, wind erosion could occur when the vegetation cover is removed during construction.

5.2.9 Agricultural Context

[Provide information on the current agricultural activities being undertaken on adjacent land parcels.]

The agricultural activities on the surrounding farms are shown in Figure 12, below and consist of mainly grain production in combination with livestock to the north, east and south, while chicken farms and feedlots are found to the west of the study area. Some land to the west, abutting the study area has been approved for the proposed Bella Riva residential estate, while the residential area of Fisantekraal is situated ±1.5 km to the southwest.

5.2.10 Agricultural Potential

[Item not prescribed by the NEMA protocol.]

Agro-ecosystem sensitivity is related to the intensity of farming activities, which in turn is related to the *agricultural potential*. In the following section, agricultural potential is firstly the combined result of the quality of the natural resources, soil, climate and water – as discussed above – whilst some degree of sustainability is also incorporated with respect to both environmental and financial sustainability.

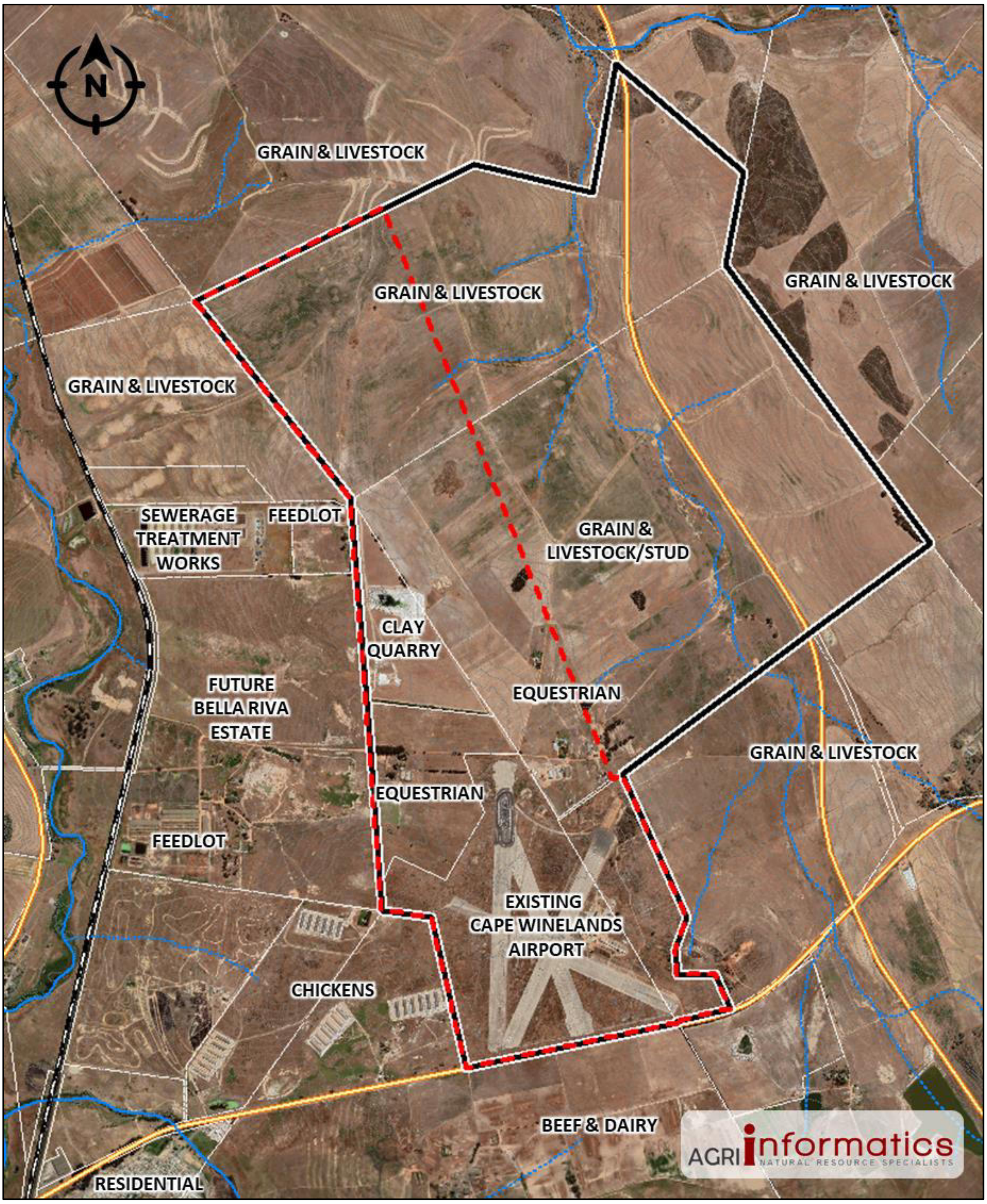


Figure 12: Spatial context of the study area and surrounding land use activities.

Medium or high agricultural potential therefore implies an above average possibility to conduct agricultural activities that will be sustainable and financially viable under normal market conditions. The discussions below attempt to analyze each of the main possible agricultural activities against this definition of agricultural potential.

a. Irrigated cultivation

The land portions of the study area have no access to irrigation water of good quality and therefore the potential for irrigated agriculture is regarded as **very low**.

b. Dry land cultivation

Dry land or rain fed cultivation refers to the practice of growing a crop without irrigation, thus fully depending on the rainfall to supply in the water requirement of the crop. During the warm summer months, when the water requirement of a summer crop would be at its highest, the rainfall is only 94 mm. This volume is not sufficient to grow any annual or perennial crop. The production of a cash crop is however limited to the cool winter rainy season when an average rainfall of 438 mm can be expected. At this rainfall the potential for winter small grain production is regarded as **high**, subject to soil properties.

c. Livestock farming

It has been shown above (paragraph 5.2.2) that an estimated 740 small stock units or about 100 large stock units can be accommodated on the 575 ha cultivated fields of Rem 474 and Ptn 7/942, being the only cultivated fields in the entire study area. The livestock farming potential is reduced by limited grazing during the late summer, but the potential is regarded as **medium-high**.

d. External factors

The economic viability of a farm with sufficient resources is largely determined by the difference between input cost and producer prices – driven by supply and demand. Other factors that can have a significant impact on viability can include distance to market – in which case the study area is moderately close to the Cape Metropole and well serviced by the road infrastructure. Security issues, such as stock theft has forced many farmers near urban settlements to abandon small stock farming. Stock theft does occur in the area and is regarded as a constraint limiting small stock farming.

e. Resulting Agricultural Potential

While the dry summers and non-availability of irrigation water limits the agricultural potential of the study area for the production of perennial crops, the adequate winter rainfall results in a **high** potential for winter cereal production, in combination with a livestock component. The soil properties of Ptn 23/724 (clay deposits) and Rem 724 (deep sand with low water retention capacity), reduces the potential of these farm portions to **medium**-**low** only.

5.3 Impact Assessment

5.3.1 Proposed development alternatives

To achieve the desired outcome of the future Cape Winelands Airport in terms of (i) positive regional economic impact through creation of job opportunities and growth in gross geographic product; (ii) contribution to support the anticipated growth in scheduled air traffic into Cape Town; (iii) becoming a full reliever airport for all airlines flying into Cape Town by offering airport redundancy; (iv) offering domestic and international passengers a second airport of choice and (v) creation of additional general aviation facilities, the airport needs to meet certain minimum runway infrastructure requirements to comply with International Civil Aviation Organization (ICAO) standards.

Following a comprehensive feasibility study and consideration of technical runway alternatives assessment, the Developer proposes the development of an aerodrome with an ICAO Reference Code 4F with Precision Approach CAT III capability. This implies a primary runway of 3 500 m in length.

The following two runway alternatives are to be considered:

- **No Go Alternative**: "Do Nothing" option. Development within current rights.
- **Preferred Alternative**: Construct a 3 500 m runway at orientation 01-19, without retention of any of the current runways.

The No Go Alternative refers to the scenario where future development is done within existing development rights. No farmland or land zoned for agriculture will be transformed in this alternative and thus there will be no impact on the agro-ecosystem.

The proposed site development plan for the preferred alternative is shown in Figure 13 below.

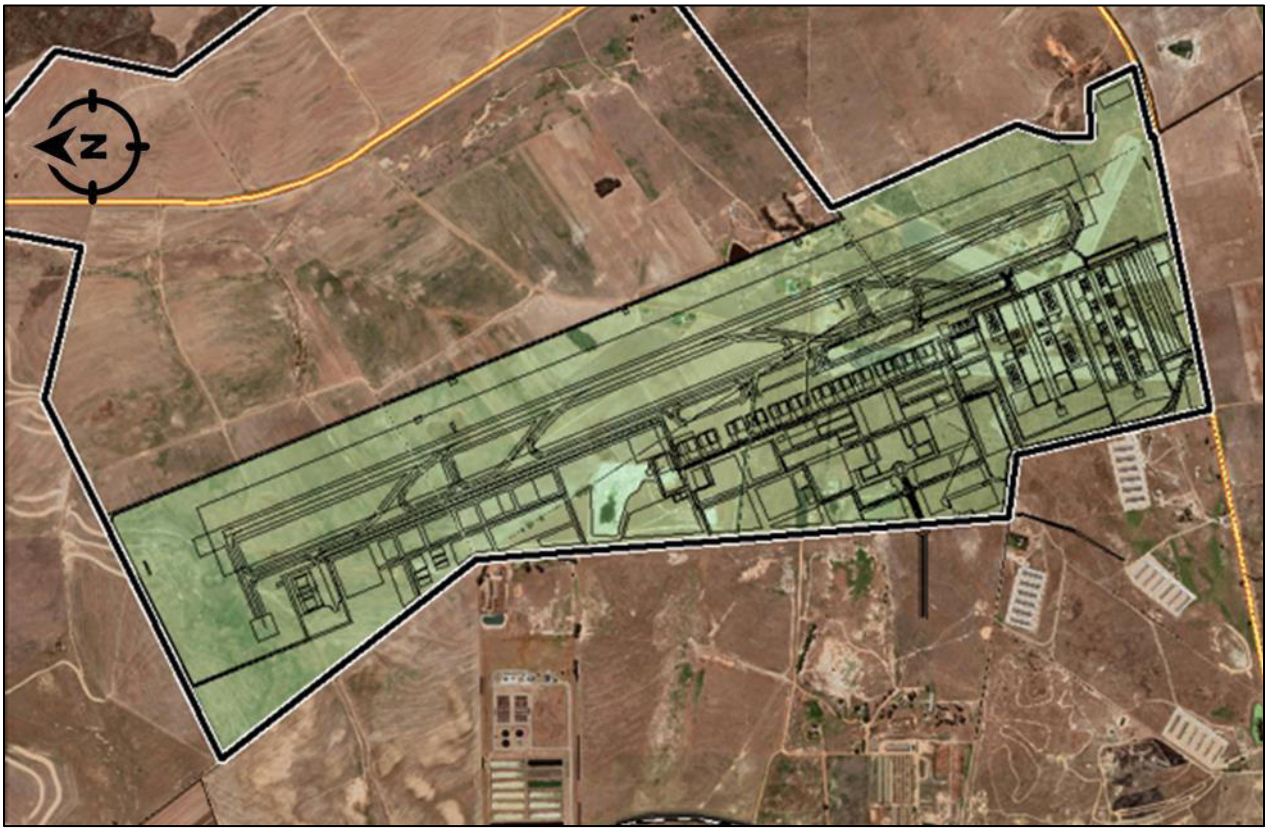


Figure 13: Proposed Site Development Plan for the Preferred Alternative (Revision 14).

5.3.2 Change in Productivity

[Provide an indication of the potential losses in production from the change of the agricultural use of the land as a result of the proposed development.]

a. Loss of productive land

The proposed development of the Cape Winelands Airport to include a runway of 3 500 m x 45 m, taxiways and the proposed airport facilities and infrastructure will occupy approximately 275 ha of land currently zoned for Agriculture. Table 8 quantifies the loss of the various land use categories. The loss of cultivated fields amounts to 168 ha, of which only ±60% (100 ha) are being cultivated per year, due to the crop rotation system followed. At an average wheat yield of 4.0 t/ha, that loss of productive land relates to a reduction of 400 tons in production or ±0.03% of the wheat production of the Western Cape, which was 1 260 000 tons in 2021/22.

Table 8: Loss of farm land associated with the proposed Cape Winelands Airport development.

Land use category	Total Area (ha)	Farm area to be rezoned (ha)	Sensitivity
Airport Precinct	8.8	n/a	
Airport Zoned	101.6	n/a	
Clay Quarry	3.9	3.9	Low
Cultivated fields	575.0	168.0	High
Dam	0.7	0.3	Low
Dam wall	0.5	0.2	Low
Drainage areas	14.0		
Eucalyptus	1.4	0.8	Low
Fall-Out Land	12.9		
Fallow Land	52.0	51.2	Low
Fallow/Grazing	36.2	19.9	Low
Farmhouses	3.4	3.5	Low
Farm road	1.5	0.6	Low
Farm sheds	2.4	2.0	Low
Gas facility	0.1		
Horse Camps	19.0	16.4	Low
Public road	3.0	2.1	Low
Road primary	4.9		
Rocky outcrops	6.7	5.5	Low
Runways	38.7	n/a	
Total	**886.8**	**274.5**	

b. Impact on Food Security

> "Food security exists when all people, at all times, have physical, [social] and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996).

Four dimensions in food security can be identified, namely:

- Availability
- Access
- Food safety and nutritional value

- Stability of supply

The potential negative impact of the proposed Cape Winelands Airport development on food security, relates to the reduction in the area that can be used for food production and therefore mainly affects only one of the dimensions – i.e. availability, while the other three dimensions relates more to aspects like food distribution logistics, affordability, quality control, seasonality, impacts of drought or other instabilities like labour unrest or war, etc..

The study area is situated in the homogeneous "Higher Rainfall Sowing Area" farming area, where the production of winter cereals – predominantly wheat in rotation with canola – is the main agronomic activity, often practiced in combination with sheep and/or cattle farming. Therefore, to illustrate the potential impact of the proposed CWA development on food security, the example of wheat production will be used, while similar arguments and outcomes for other grain crops can be presented.

The loss of productively cultivated land to accommodate the airport development has been measured by GIS, to be 168 ha (paragraph 5.3.2), which will result in a reduction of wheat production of an estimated 400 ton, assuming the general crop rotation system would have resulted in only 100 ha being planted to wheat and an average optimistic yield of 4.0 t/ha would have been achieved.

South Africa consumes ±3.5 million tons of wheat annually (SAGIS 2022/23 season). The average South African production since 1990 is 1.9 million tons (1.8 million tons during the past decade). The shortfall of between 40% and 50% are imported from mainly Russia, Australia, Poland, Lithuania, Ukraine, Germany, Canada and the USA.

Historic wheat production figures show that up to 2 million hectares were planted to wheat between circa 1970 and 1990. The highest production was in the 1988/89 season when a total 3.62 million ton were produced at an average production of 1.80 t/ha. Figure 14 also shows how technological advances in farming practices, technology and seed genetics have led to a four-fold increase in the average wheat production in South Africa from ±1.0 t/ha (circa 1950) to more than 4.0 t/ha at present. The withdrawal of land with marginal production potential – mainly in lower rainfall regions – potentially also contributed to the increase in average yield.

The total area planted under wheat varies from season to season and is *inter alia* related to seasonal rainfall patterns and wheat price expectations, relative to other crop options.

Dryland wheat production in the Western Cape resulted in a total yield of 873 750 tons in the 2022/23 season (1 236 000 in the 2021/22 season), which converts to 44% of the national production. The area used for wheat production in the Western Cape is around 350 000 ha and the average yield varies between 2.5 and 3.5 t/ha for dryland production.

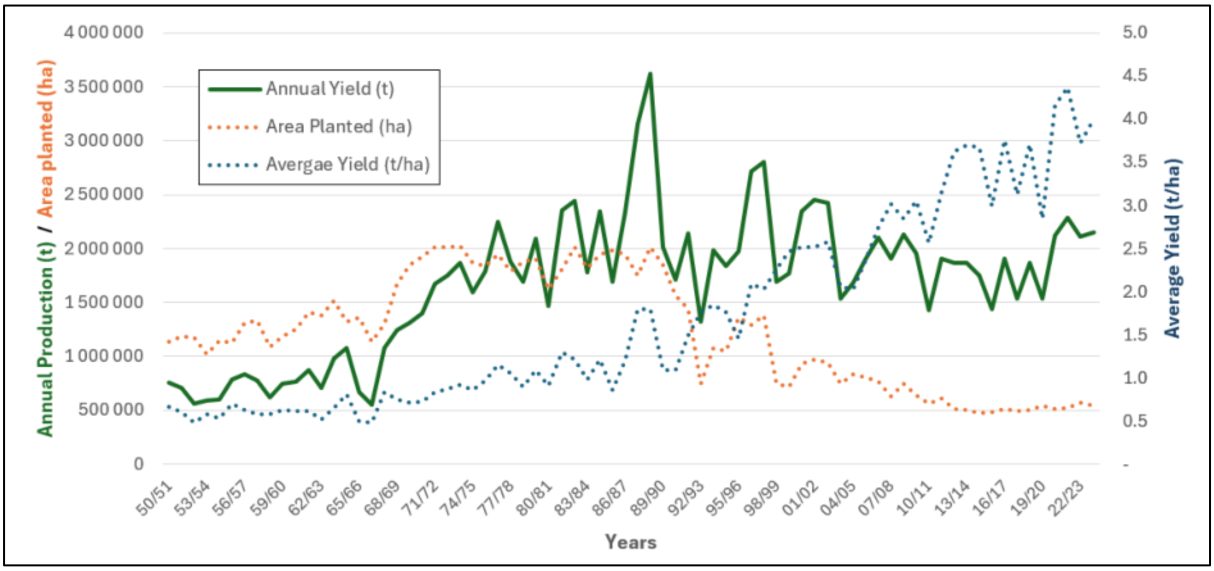


Figure 14: Wheat production statistics of South Africa since 1950.

The above information suggests that the contribution of wheat production to South Africa's food security is not limited by a lack of arable land, as only ±560 000 ha are currently used for production, compared to around 2 000 000 ha of four decades ago. Despite the drastic reduction in area planted, since 1990, the national production has remained stable at 1.5 million to 2.1 million tons per annum, du eto higher yield levels. In the Western Cape, the area under production effectively increased by ±50 000 ha over the past decade, mainly driven by a conversion from barley to wheat.

Food security in terms of wheat supply is further supported by imports from various countries across the world, which mitigates climatic and political risk factors. Import logistics with specific reference to efficiency and capacity at our ports are more likely to impose restrictions on grain imports than limitations in global production.

The potential loss of 400 tons of wheat is equal to 0.01% of the national wheat consumption, 0.02% of the national wheat production and 0.03% of the Western Cape's wheat production. While this loss of production is not negligible its impact on food security is.

While difficult to quantify at this stage, it can be expected that the new Cape Winelands Airport can support food security by its contribution to access to food, through its role in food distribution logistics as well as job creation that will lead to wider food affordability.

c. Loss of farming infrastructure

The proposed airport development intersects with existing farm infrastructure, including a farm dam, sheds and farm houses as quantified in Table 6 above.

5.3.3 Change in Employment

[Provide an indication of the potential losses in employment from the change of the agricultural use of the land as a result of the proposed development.]

The conversion of the land is expected to reduce the employment from 20 to 12 permanent opportunities. It can be expected that the job opportunities created by the proposed airport and related facilities will render this loss insiginificant.

5.3.4 Possible Long-Term Benefits

[Provide an indication of the possible long-term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land.]

The only direct long-term benefits of the proposed rezoning to the current farming operation is:

- A capital injection into the remainder of the farm;
- Improved security in the area.

The wider benefit of the proposed international airport falls beyond the scope of this assessment, but has been duly addressed by an encompassing socio-economic study.

5.3.5 Additional Environmental Impacts

[Mention additional environmental impacts expected from the proposed development based on the current status quo of the land, including erosion, alien vegetation, waste, etc..]

Other potential impacts on agricultural resources, relates to stipulations of the Conservation of Agricultural Resources Act, CARA Act 43 of 1983. In the case of the CWA development the following are applicable:

- Possible soil degradation by wind and/or water erosion
- Impact on vleis, marshes, water sponges and water courses
- Impact on the flow pattern of run-off water

The airport development will introduce vast areas of hard surfacing in the form of runways, taxiways, aprons, parking areas and rooftops, which will prevent infiltration of rainfall and introduce run-off with severe water erosion consequences on adjacent farm land. However, it can be expected that the enigineering design will consider this and design the required infrastructure for the detention and controlled release of storm water. Such release into existing drainage channels could still impact on the flow pattern of run-off water and also impact on downstream vleis, marshes, water sponges and water courses.

As some parts of the proposed development envelope intersects with very sandy soils at the surface layer, wind erosion could occur during construction if not considered and controlled.

5.3.6 Alternative Development Footprints

[A motivation must be provided if there where alternative development footprints identified as having a "low" or "medium" sensitivity and that where not considered appropriate.]

While the developer might have considered alternative development sites, the screening of such options was not part of the scope of this study.

5.3.7 Impact Mitigation through Micro-siting

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

While micro-siting is more relevant in the case of the footprint of renewable energy structures, it is noteworthy that the development proposal is very compact and land efficient and the latest development plan has significantly reduced the impact on the productive farmland. It is also clearly demarcated and fenced which will minimize disturbance to the agricultural activities on the remainder of the farmland.

5.3.8 Cumulative Impacts

a. Other developments

Other developments in the general vicinity of the CWA includes the Bella Riva mixed-use development, the Greenville Garden Cities future phases and other developments within the N1 corridor between Paarl and Cape Town. The specific footprints of these developments have not been researched by this study, but it can be assumed that it also intersects with productive agricultural land in places, which will contribute to the cumulative impact – i.e. reduction in arable land – induced by the CWA in conjunction with these developments.

b. Climate change

While climate change predictions for the Western Cape vary depending on the assumed scenarios and models used, it mostly correlates in terms of key trends, which includes:

- Temperature increases
- Changes in precipitation patterns – seasonality and likely reductions in rainfall
- Increased extreme weather events
- Sea level rise

While the latter can be disregarded in the context of this report, temperature increases, reduction in rainfall patterns and extreme weather events can have significant implications for dryland (rain-fed) agriculture. The following main predictions are made for the Western Cape (CSAG, 2022):

- Temperature trends of +0.1°C/decade.
- Rainfall trends vary and is not significant ($p<0.05$) for many zones. More significant drying trends occur in some of the interior zones.
- Trends in potential evapotranspiration (PET) are consistently significantly positive, driven by consistently positive and significant temperature trends. Trends in PET are highest in the most southern and the most western zones, while being strongest in spring (September-November) and summer (December-February).

Contrary to these trends, the precipitation trend for the Swartland and Boland areas (including the study area), during the winter grain growing season (May – October), appears positive as shown below (Wolski et al, 2021).

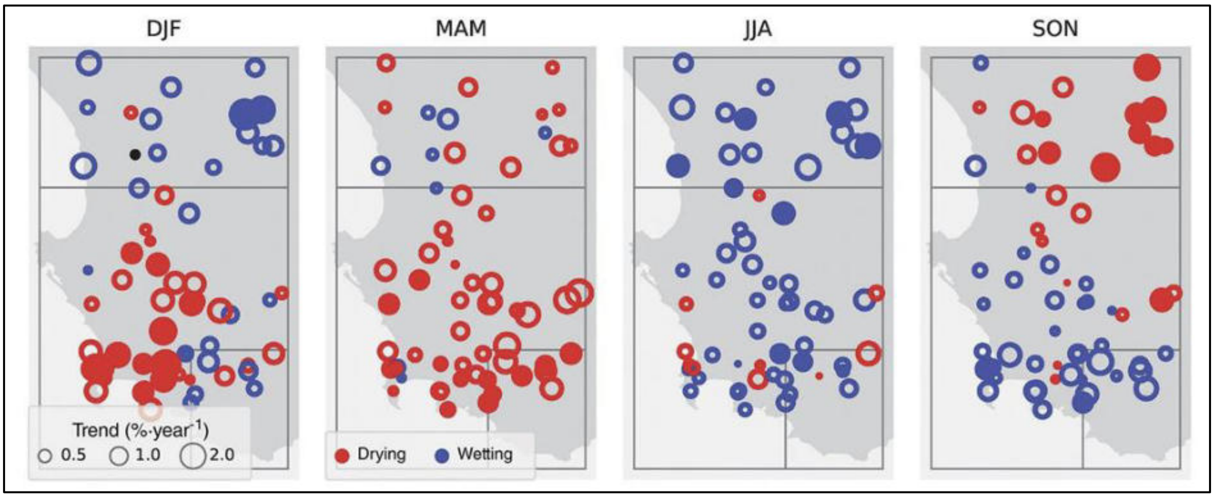


Figure 11: Trends in seasonal rainfall totals at individual gauges in the recent period (1981-2014, excluding the 2015-2017 drought). Filled symbols show a trend significant at the 5% level. (Wolski *et al*., 2021, as cited by CSAG, 2022.)

Increased rainfall can raise the risk for overly wet and waterlogged conditions during the growing season, but this can be mitigated by appropriate agronomic practices (i.e. ridging). Therefore, in these production areas a higher rainfall generally results in higher yields.

The impact of the proposed CWA development on the reduction in cultivated area and grain production can therefore be partly or fully mitigated by a higher winter rainfall as predicted by climate change trends.

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.]

Consideration of the strategic and economic importance of the proposed Cape Winelands Airport at local and regional scale falls beyond the scope of this study, but it is accepted to be high, as has been duly demonstrated by various studies undertaken by the applicant. The extent and delineation of the affected productive land and farm infrastructure is dictated by ICAO Standards on runway length and infrastructure requirements, by integration into the Cape Town airspace and by prevailing wind direction which determines runway orientation.

While the impact of the loss of 168 ha high potential productive land is regarded as high, it is deemed justified in terms of the perceived importance of the proposed Cape Winelands Airport development as a key infrastructure node for the Cape Metropole and surrounding districts and is therefore supported and recommended for approval.

5.4.2 Special Conditions

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

No special conditions are attached to the specialist statement.

5.4.3 EMPr requirements

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

The loss of productive farmland, as indicated above, is regarded as inevitable but further loss of productive farmland should be prevented, by clear demarcation of the development envelope during the construction phase, while no vehicle or other activity should be allowed outside of the demarcated area.

Soil erosion by wind, during construction, should be mitigated by minimizing bare soil surfaces without adequate protection, either by applying a mulch cover or wetting the surface or similar action.

Suitable run-off and soil erosion control measures and infrastructure should be designed and implemented to limit and restrict the loss or degradation of soil.

The release of run-off water into existing streams should be controlled to minimize impact on vleis, marshes, water sponges and water courses. This activity may include a permitting application to the Department of Water and Sanitation.

5.5 Knowledge Gaps

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

No specific knowledge gaps that could have a material impact on the outcome and findings of this study have been identified.

6. References

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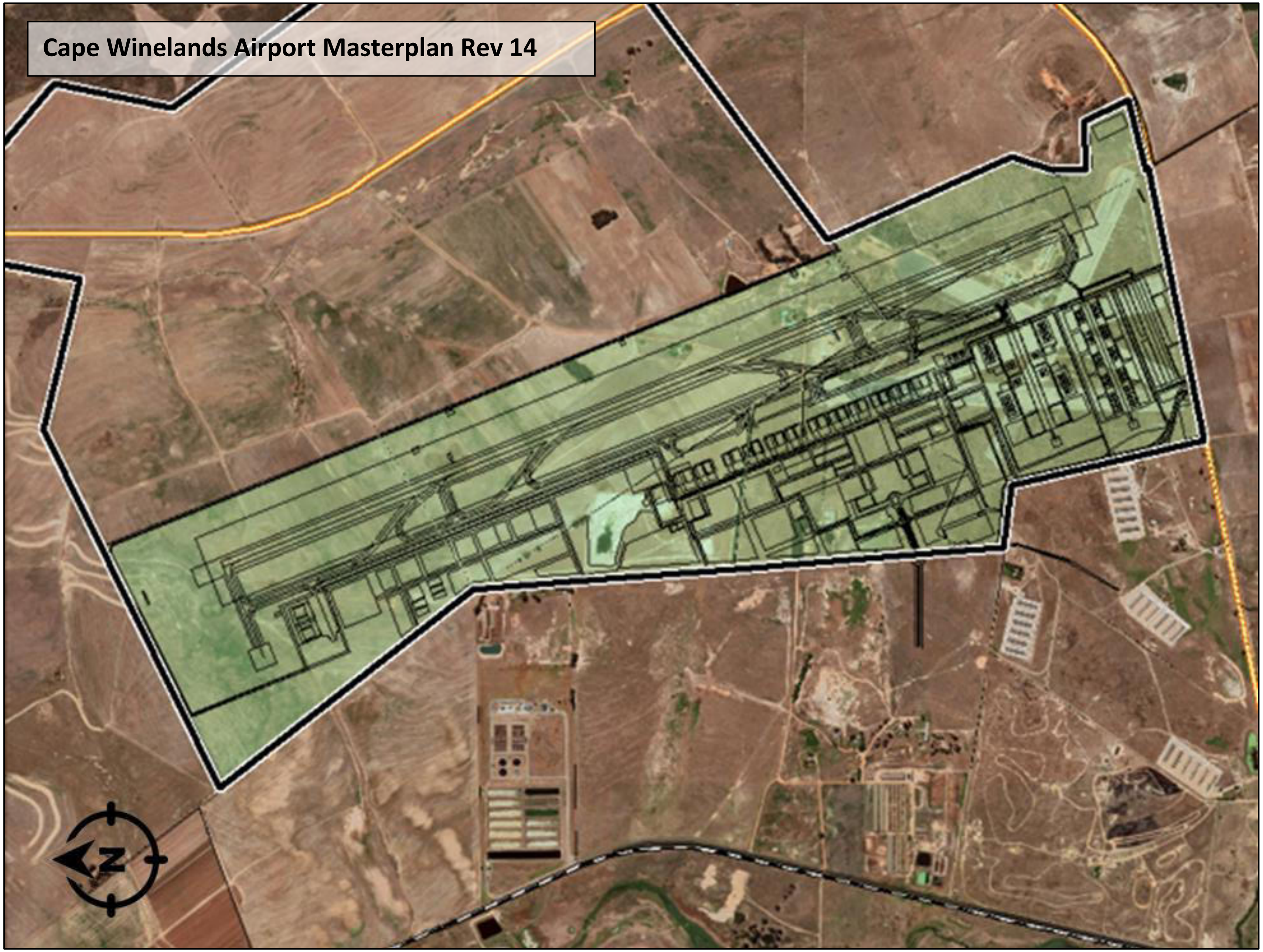
APPENDIX

Site Development Master Plan of the Preferred Alternative (Rev. 14)

Land Type Memoirs

Soil Profile photo collage

Curriculum Vitae: FH Knight


Cape Winelands Airport Masterplan Rev 14
N

LAND TYPE/ *LANDTIPE* : **Db41**

CLIMATE ZONE/ *KLIMAATSONE*: 2622W
Area/ *Oppervlakte* : 3418ha
Estimated area unavailable for agriculture
Beraamde oppervlakte onbeskikbaar vir landbou : 50ha

Occurrence (maps) and areas / *Voorkoms (kaarte) en oppervlaktes:*
3318 Cape Town (3418ha)

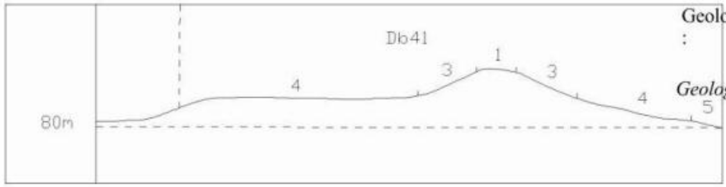
Inventory by/ *Inventaris deur:*
B Stehr
Modal profiles/ *Modale profiele:*
Geen/None

Terrain unit/ *Terreineenheid*	1	3	4	5	Total/ *Totaal*	
% of land type/ *% van landtipe*	8	15	70	7		
Area/ *Oppervlakte (ha)*	273.44	512.7	2392.6	239.26		
Slope/ *Helling (%)*	1 - 2	5 - 10	2 - 4	1 - 2		
Slope length/ *Hellingslengte (m)*	100 - 600	200 - 500	1000 - 200	20 - 100		
Slope shape/ *Hellingsvorm*	Y-Z	Y	Z	Z		
MB0,MB1 (ha)	41	488	2274	240	S>12%	0
					S<12%	3040
MB2-MB4 (ha)	232	26	120	0		378

Soil series or land classes *Grondseries of landklasse*	Depth *Diepte* (mm)	MB	1 %	1 ha	3 %	3 ha	4 %	4 ha	5 %	5 ha	Total ha	Total %	Clay content *Klei-inhoud* % A	E	B21	Texture *Tekstuur* Hor	Class *Klas*	Depth limiting material *Diepte-beperkende materiaal*
Rock/Rots		4	70	191							191	5.6						
Heights Es41, Darling Es42	300 - 600	0			25	128	24	574	60	144	846	24.8	2-6	2-6	>25	E	me/coSa	pr
Umtentweni Kd21, Katarra Kd22	600 - 1200	0			10	51	31	742			793	23.2	2-6	2-6	>25	E	me/coSa	gc
Graafwater Ss21 Umtentweni Kd21	300 - 500	1			20	103	20	479	40	96	678	19.8	0-6			A	meSa	pr
Rondevlei Wa20	800 - 1200	0					10	239			239	7	2-6	2-6		E	meSa	gc;hp
Umtentweni Kd21, Katarra Kd22	600 - 1200	1			15	77	4	96			173	5.1	2-6	2-6	>25	E	me/coSa	gc
Klipfontein Ms11	<300	3			5	26	5	120			146	4.3	2-6			A	me/coSa	hp
Fernwood Fw11	900 - 1200+	0					4	96			96	2.8	2-6			A	meSa	so;R
Hamman Wa30	300 - 500	0			5	26	2	48			74	2.2	2-6	2-6		E	coSa	hp
Williamson Gs16	300 - 500	0	15	41	5	26					67	2	15-25			A	fiSaLm-SaClLm	so;R
Sonnenblom Cv21	600 - 900	0			10	51					51	1.5	2-6		2-6	B	meSa	R;so
Mispah Ms10	<300	3	15	41							41	1.2	10-25			A	fiSaLm-SaClLm	R
Rosehill Sw30, Graafwater Ss21	300 - 500	0			5	26					26	0.8	2-6		15-35	B	meSaLm-SaClLm	vp;pr

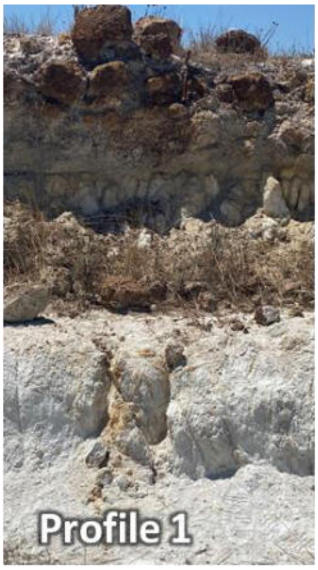
Terrain type/ *Terreintipe :* A1
Terrain form sketch/ *Terreinvormskets*

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



Geology : Mainly surficial cover formed in situ on Malmesbury rocks as well as greywacke, phyllite, and quartzitic sandstone of the Tygerberg Formation, Malmesbury Group; occasional ferricrete.

Geologie: Hoofsaaklik oppervlakafsettings wat in situ gevorm het op Malmesbury gesteentes asook grouwak, filliet en kwartsitiese sandsteen van die Tygerberg Formasie, Malmesbury Groep; plek-plek ferrikreet.


Profile 1

Profile 2

Profile 3

Profile 4

Profile 5

Profile 6

Profile 8

Profile 9

Profile 10

Profile 11

Profile 12

Profile 13


Profile 14

Profile 15

Profile 16

Profile 17

Profile 18

Profile 19

Profile 20

Profile 21

Profile 22

Profile 23

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
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+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. Francois is also a non-current private pilot with a dream to fly a Pilatus PC-12, some day.

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 – present: 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, Stellenbsoch**

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.

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)
- Aviation
- Assisting fellow Africans, to gain access to the opportunities he grew up with.

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

Etienne Erasmus: Retired CEO Netafim South Africa:	+27 82 784 2693
Piet Brink: Manager: Agronomic Services and Research Yara South Africa:	+27 82 658 6005
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

Curriculum Vitae: Francois H Knight – March 2024

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.

Moolman, J.H. De Clercq, W.P., and **Knight, F.H**, 1993, Macropore flow and drainage rates: A case study in two micro-irrigated vineyards, in Workshop on Micro Irrigation Worldwide, Congress on. Irrigation and Drainage, 15th, The Hague, The Netherlands: Proceedings, p. 193-205.

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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.

Knight, F.H., P.P. Brink, N.J.J. Combrink and C.J. van der Walt. 2000. Effect of nitrogen source on potato yield and quality in the Western Cape. FSSA Journal 2000, pp. 157-158.

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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. 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), Great Cormorant Investments (Goergap), Ninham Shand (Oudtshoorn Water 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, 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, PHS Consulting 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.