

Annexure 3 - 1: Agricultural Study

Soil Survey on part of Portion 10 and Portion 14 of the farm Tregaron No.92; Uitenhage

Prepared by:

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June 2025

Prepared for:

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1. SUMMARY

A soil survey of 117.2 ha. was conducted on parts of the following properties:

1. Portion 10 of the farm Tregaron No 92; Uitenhage, and
2. Portion 14 of the farm Tregaron No 92; Uitenhage to assess the suitability of the soils for the establishment of citrus.

The areas surveyed are under previously planted citrus orchards and do not include zones comprising infrastructure such as canals, roads or buildings.

Figure 1 shows the location of the project area. Twenty-one soil pits were excavated and one soil auger and the soil profiles described. The data was used to delineate like soil bodies. A soil map (Figure 2) provides the spatial location of these soil bodies. The report incorporates descriptions of the different soils and provides soil suitability ratings for citrus.

Appendix I provides the soil descriptions of each soil pit.

2. METHODS

Twenty-one soil pits were excavated using a JCB digger to a depth of 1.2 m or until underlying hard rock was reached. The location of each soil pit was fixed with a GPS. The soils were described and classified using the South African soil classification (Soil Classification Working Group, 2018). These soil pit locations were then overlayed on the satellite imagery, and the soil information used to delineate the soil boundaries. Features such as clay percentage, soil depth and soil classification are important for the soil unit differentiation. The location of the soil pits is shown in Figure 2, the soil map.

No soil samples were taken for chemical analyses. Clay percentages were determined by the finger test. Soil alkalinity was tested for each horizon using a 10% solution of HCl.



Figure 1. Location of project area

3. TERRAIN

The area comprises gently sloping lower foothills. Altitudes range from 75 to 115 m.a.s.l.

4. GEOLOGY and SOILS

The geology map indicates that the area is underlain dominantly by the Kirkwood formation, comprising reddish and greenish mudstone and sandstone (Geological Survey, 1991). Hard and soft carbonate layers were also identified in parts, overlying the parent rock.

The soils generally were found to be moderately deep to deep, clay rich, frequently with a fine weak blocky structure. They are dark brown to dark reddish brown, stone free and commonly overlie shale saprolite or soft carbonate layers. The soils were grouped according to soil classification, effective soil depths, soil structure and texture. These groups are described below.

4.1 The following soil types were described in the survey area:

Hutton (Hu)

ORTHIC A/RED APEDAL B

A dark reddish brown sandy clay topsoil overlies a dark red, apedal sandy clay. These soils are friable, have an optimal WHC have good internal drainage.

Kimberly form (Ky)

ORTHIC A/RED APEDAL B/SOFT CARBONATE

A dark brown to reddish brown, apedal sandy clay topsoil overlies a dark reddish brown sandy clay which overlies a soft carbonate at 50-75 cm depth. These soils generally have restricted depth which reduces their efficacy and WHC.

Valsrivier (Va)

ORTHIC A/PEDOCUTANIC B

A dark brown, moderate fine blocky structured, sandy clay topsoil overlies a well-developed, fine blocky structured sandy clay which overlies saprolite in places. Often a difficult soil to manage due to strongly developed structure and reduced internal water movement.

Burgersfort (Bg)

ORTHIC A/NEOCARBONATE B/ LITHIC

A dark yellowish brown, weak blocky, friable sandy clay overlies a dark yellowish brown, weak blocky sandy clay subsoil overlying saprolite at 80 cm depth. These soils have a moderate WHC.

Makgoba (Mb)

ORTHIC A/NEOCUTANIC B/NEOCARBONATE B

A dark brown to dark reddish brown sandy clay loam overlies a neocutanic, sandy clay overlying a soft carbonate lower subsoil.

Augrabies (Ag)

ORTHIC A/NEOCARBONATE B

A dark brown sandy clay loam topsoil overlies a cutanic dark reddish brown sandy clay with a weak blocky structure to depths of 50-120 cm overlying a soft saprolite

Katspruit (Ka)

ORTHIC A/GLEY

A very dark greyish brown clay topsoil 30 cm deep overlies a weakly structured, firm clay subsoil.

Coega (Cg)

ORTHIC A/HARD CARBONATE

A dark brown sandy clay loam some 30 cm deep abruptly overlies a hard carbonate.

Grabouw (Gr)

ORTHIC/DISTURBED SUBSOILS

A sandy clay topsoil some 30 cm thick overlies a stony infilling which overlies a sandy clay loam.

4.2 Soil Map & soil potential

The soil map shows the distribution of the soil types, and the legend (Table 1) provides soil data pertaining to these units. Table 2 gives soil suitability, hazards and suggested soil preparation methods.

Soil potential is determined by physical characteristics of the soils such as depth to limiting layers, texture and structure, which all effect soil water holding capacity and drainage. Soil potential was assessed for the establishment of citrus orchards. Table 2 indicates the soil potential for irrigated citrus. The soils have been rated from high to low. Soil units were downgraded due to restricted depth and low WHC as well as poor retention of nutrients. All soil horizons were tested using a 10% HCl solution in order to classify them correctly.

The soil units have also been rated using the international **land capability classification** (LCC). The classes indicate the most intensive tillage that can be practiced safely with permanent maintenance of the soil (McRae and Burnham, 1981). There are 8 classes where classes I-IV are suitable for agriculture. The soil units were rated between I and V.



Figure 2. Soil Map

Table 1. LEGEND TO SOIL MAP

SOIL UNIT	DOMINANT FORMS & FAMILY	OTHER FORMS	ERD cm*	ARD cm	LIMITATIONS	CLAY % A	CLAY % B	STRUCT A	STRUCT B
Ag 1	Augrabies 2220, 2110	Makgoba 1110	80-120	120	Dense saprolite in parts	30-40	45-60	a	a-wfb
Ag 2	Augrabies 2110		90	110	Restricted depth	25-30	35-45	a	a
Bg 1	Burgersfort 1111	Augrabies 1110	50-60	80-100	Restricted depth	40-55	45-60	a	a-wmb
Bg 2	Burgersfort 2211, 2110		80	100	Restricted depth	20-35	26-38	a	a
Mb 1	Makgoba 1220		50-70	80-100	Dense subsoil	25-30	35-50	a	wmb
Ky 1	Kimberley 1200, 2100	Hutton 2310	120	120	Restricted depth; soft carbonate	35-40	40-50	a	wfb
Va 1	Valsrivier 1320	Katspruit 1220	50	80	Dense structure; restricted drainage	35-45	45-55	wfb	mfb

Gr 1	Grabouw 2000	Katspruit 1220	35	60	Dense subsoil; restricted drainage	25-35	45-60	wfb	mfb
Cg 1	Coega 1100	Brandvlei 1200	15-30	50	Restricted depth; calcrete	15-18	-	a	m

SOIL FORM & FAMILY: refer to 'SOIL CLASSIFICATION 2019'.

ERD = effective rooting depth; ARD = ameliorated soil depth; WHC = water holding capacity

STRUC = soil structure: a = apedal; w=weak, m=moderate; f=fine, m=medium; b=blocky, c=crumb

The effective rooting depth given in Table 1 relates to depth limiting horizons such as dense sub-soil layers, parent rock/saprolite or stone content.

Table 2. SOIL POTENTIAL AND HAZARDS

SOIL UNIT	LCC	Irrigation suitability for Citrus	Erosion hazard	Compaction hazard	Soil preparation	Area (ha)
Ag 1	I	HIGH	ML	H	Deep rip & Ridge	43.3
Ag 2	I	HIGH	ML	H	Deep rip & Ridge	2.3
Bg 1	I	HIGH	ML	H	Deep rip & Ridge	32.4
Bg 2	I	HIGH	ML	MH	Deep rip & Ridge	15.4
Mb 1	I	HIGH	ML	MH	Deep rip & Ridge	4.5
Ky 1	I	HIGH	ML	MH	Deep rip & Ridge	15.0
Va 1	IV	MOD	MH	H	Deep rip & Ridge	1.3
Gr 1	IV	MOD LOW	MH	MH	Deep rip & Ridge	1.9
Cg 1	IV	MOD LOW	ML	M	Ridge only	1.1

LCC = Land Capability Classification

Table 3. SUMMARY OF EXTENT OF POTENTIAL RATING IN HECTARES

CROP	HIGH	MOD. HIGH	MOD.	MOD. LOW	LOW
Citrus	112.9	0	1.3	3.0	0

Soil Amelioration

Most of the subsoils are friable in the moist state although set hard in the dry state. Deep ripping to 1 m will benefit deeper rooting while ridging is recommended over the rip-lines. The top 30 cm or only

topsoil should be used to create the ridges. This should provide effective rooting depths in excess of 80 cm. in most instances.

Potential ratings given above can be improved with appropriate soil management including suitable fertilization and irrigation schedules, hence utilizing some shallower soils better.

References:

- Soil Classification Working Group. 2018. Soil Classification, a natural and anthropogenic system for South Africa. ARC -Institute for Soil, Climate and Water, Pretoria.
- Geological Survey, 1991. 1:250 000 Geological Series; 3324 Port Elizabeth. Pretoria.
- McRae S.G. and Burnham C.P. 1981. Land evaluation. Monographs on soil survey. Clarendon Press, Oxford.

APPENDIX I SOIL PIT DESCRIPTIONS

OBS	FORM	FAMILY	TSD	ESD	ASD	LTN	W	LITH	HOR	DPTH	COL	Clay	SG	CON	STR	STO	PERM
1	Ag	2220	120	120	120		0	Sh	A	30	RB	45	1	1	a		r
									B	120	DRB	60	1	1	a		r
2	Ag	2220	120	120	120		0	Sh	A	30	DB	25	1	1	a		r
									B1	90	DYB	45	1	1	a		r
									B2	120	RY	26	1	1	a		r
3	Mb	2110	120	120	120		0	Sh	A	30	DB	25	1	1	a		mr
									B1	70	DYB	36	1	1	a		mr
									B2	120	YB	35	1	1	a		mr
4	Hu	2320	120	120	120		0	Sh	A	30	DB	28	1	1	a		r
									B	90	DRB	48	1	2	wfb		r
									B2	120	RY	65	1	2	wfb		r
5	Ag	2110	120	50	90	so	0	Sh	A	40	DB	35	1	1	a		r
									B	50	DRB	48	1	1	a		r
									C	120	CRB	50	1	3	m		mr
6	Mb	1110	120	120	120		0	Sh	A	40	DB	50	1	1	a		r
									B1	90	DYB	60	1	2	a		r
									B2	120	YB	70	1	2	a		r
7	Ag	2210	120	120	120		0	Sh	A	40	DB	40	1	1	a		r
									B	120	DRB	55	1	2	a		r
8	Bg	2111	120	60	90	so	0	Sh	A	30	DB	36	1	1	a		r
									B	60	YB	36	1	3	m		mr
									Ch	120							
9	Bg	2211	120	70	100	so	0	Sh	A	40	DB	40	1	1	a		r
									B	70	DRB	50	1	1	a		r
									Cs	120	YB	40	1	3	a		mr
10	Bg	2211	120	60	90	so	0	Sh	A	30	DRB	56	1	1	a		tr
									B	60	DRB	55	1	1	a		tr
									C	120	DB	55	1	2	m		tr
11	Ka	1220	100	20	40	G	3	Sh	A	20	VDGB	45	1	1	a		mr
									G	100	MYG	70	1	2	wcb	3s	s
12	Bg	2210	120	60	90	so	0	Sh	A	25	DRB	50	1	1	a		mr
									B	50	RB	60	1	2	a		mr
13	Gr	2000	120	130	120		0	Sh	A	30	DRB	50	1	1	a		mr
									SL	60	DRB	50	1	3	m		mr
									B	120	DRB	36	1	1	a		r
14	AG	2210	120	120	120		0	Sh	A	30	DRB	36	1	1	a		r
									B	120	DR	40	1	1	a	ls	r
15	Bg	2211	120	100	100	so	0	Sh	A	30	DB	30	1	1	a		r
									B	100	DRB	46	1	2	a		r
									C	120							
16	Bg	2211	100	60	100	so	0	Sh	A	30	DRB	60	1	1	a		r
									B	60	DRB	60	1	1	a		r
									Cs	100	GB						
17	Bg	2110	100	60	100	so	0	Sh	A	25	DYB	35	1	1	a		r
									B1	60	DYB	38	1	2	a		r
									B2	100	DYB			3	m		mr
18	Bg	2211	80	80	100	R	0	Ss	A	30	DB	28	1	1	a		r

									B	80	RB	38	1	2	a	r
									R							
19	Ka	2220	20	20	40	G	2	Sh	A	20	DGB	50	1	1	a	s
									G	90	GB	60	1	2	m	s
20	Nk	2312	120	100	100	so	0	Sh	A	35	DB	25	1	1	a	r
									B	100	DRB	26	1	2	a	r
									Ch	120						
21	Bg	2211	100	100	100	so	0	Sh	A	30	DB	35	1	1	a	r
									B	100	CRB	38	1	1	a	r
									Ch							
22	Bg	2211	120	100	100	so	0	Sh	A	40	DB	20	1	1	a	r
									B	100	CDB	35	1	2	a	r
									C	120						

KEY TO CODES

OBS	Soil observation No.	
FORM	Soil form	
FAMILY	Family	
TSD	Total soil depth - cm	
ESD	Effective soil depth - cm	
ASD	Ameliorated soil depth - cm	
LTN	Depth limitation	st=stone; d=dense structure; R=hard rock; so=saprolite; w=wetness 0=no wetness; 1=occasional 2=seasonal
W	Wetness class	wetness 2=seasonal
LITH	Lithology (Geology)	Ss=Sandstone; Sh = shale
HOR	Horizon (soil layer)	
DPTH	Depth in cm	
COL	Munsell colour	C=cutanic, M= mottled, V= very; D=dark, G=grey, B=brown, Y=yellow, R=red; L= black
Clay	clay %	
SG	sand grain	f=fine; m=medium; c=coarse
CON	consistency	1 = soft/friable; 2= slightly firm; 3= firm 4=hard
STR	Structure	sg=single grained; a=apedal DEGREE: w=weak; m=moderate; s=strong SIZE: f=fine; m=medium; c=coarse TYPE: c=crumb, b=blocky
STO	% stone	5=50%; s=stone; r=rock; g=gravel
PERM	Permeability	r=rapid; m=moderate; s= slow



herewith certifies that
Gavin Nicholas Schafer
Registration Number: 400081/03
is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)
Soil Science (Professional Natural Scientist)

Effective 15 May 2003

Expires 31 March 2027



President of Council

Chief Executive Officer



CURRICULUM VITAE

GAVIN SCHAFER

MSc.Agric.(Soil Sci.) (Univ.KZN., 1992)., Dip. Forestry (Saasveld 1974)
Pr.Sci.Nat

Soil Scientist- Pedologist

SPECIALIZATION

- Soil mapping
- Land capability classification
- Soil productivity evaluation
- Wetland mapping
- Afforestation & agricultural planning

EMPLOYMENT

1974-75 – Loxton Hunting and Associates	Pedologist
1976-81 - South African Forest Research Institute	Soils Researcher
1981-83 - Loxton Venn & Associates	Pedologist
1983-91 - South African Forest Research Inst.	Soils researcher
1991- 94 – CSIR	Soil Scientist
1994-2005 – Self-employed: Consultant	Soil Scientist
2006-2011 – Sun Biofuels Ltd. U.K.	Soil Scientist
2011- present – Self-employed -Consultant	Soil Scientist

EXPERIENCE

Research and Development highlights:

- Develop site/tree growth models for *Pinus radiata* and *P. elliottii*
- Develop wetland classification for Tsitsikamma plantations
- Develop site/growth model for *Jatropha curcus* –biofuels
- Develop fertilizer model for *Jatropha curcus* - biofuels

Soil Mapping

- Soil surveys conducted of many farms and plantations in South Africa, as well as Swaziland, Tanzania, Malawi, Ethiopia, Mozambique, Uganda, Zambia, the Solomon Islands and Cambodia from 1974 to current.
- They include soil surveys and land productivity evaluations conducted on behalf of timber companies such as Hans Merensky, SAFCOL, DWAF, MTO, Amathola Forests, New Forests, MONDI and SAPPI, Asgisa, Press Agriculture.
- Soil surveys for agricultural dry land planning: South Africa, Mozambique and

- Soil surveys for irrigation planning: Botswana (Gitec), South Africa (Eastern Cape Development Corporation), former Ciskei and Transkei (Dept. of Agriculture).

Surveys for EIA's: Citrus development in Sundays River Valley, Gamtoos Valley and Cookhouse. Surveys of farms in the Langkloof for deciduous fruit orchard planning.

- Soil Surveys and agricultural assessments for land rezoning (Hilland Associates, Univ. of Stellenbosch, Dept. of Land Affairs).

Soil mapping and site productivity evaluation of Cape Plantations:

- Safcols Western and Eastern Cape Plantations
- Amathola Forests plantations
- Farms for PG Bison in the Elliot area
- Singisi Plantations
- Asgisa Eastern Cape



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DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

(For official use only)

File Reference Number:

NEAS Reference Number:

Date Received:

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of **4 May 2026**.

PROJECT TITLE

**Agricultural Activities carried out on portions 10 and 14 of Farm Tregaron No 92,
Sunland, Ward 8 of the Sundays River Local Municipality, Sarah Baartman District Municipality, Eastern Cape**

SPECIALIST ¹

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4.2 The SPECIALIST

I, Gavin Schafer, declare that –

General declaration:

- I act as the independent Specialist in this application
- 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 environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;

- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.

Signature of the environmental assessment practitioner:

Name of company:

Terramap.

Date:

Signature of the Commissioner of Oaths:

Date:

Designation:

¹ Curriculum Vitae (CV) attached

Official stamp (below).

CERTIFIED A TRUE COPY OF THE ORIGINAL

Linda Brand

LINDA BRAND

COMMISSIONER OF OATHS

FINANCIAL MANAGER

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Appointee No: 9116/2

Date:

11/8/2026