

**Western extension to Hermitage Quarry,
Aylesford Kent**

**Agricultural Land Classification &
Statement of Site Physical
Characteristics**

March 1998

**Resource Planning Team
Eastern Region
FRCA Reading**

**RPT Job Number 2013/014/98
FRCA Reference EL 20/1853**

**AGRICULTURAL LAND CLASSIFICATION &
STATEMENT OF SITE PHYSICAL CHARACTERISTICS**

**WESTERN EXTENSION TO HERMITAGE QUARRY
AYLESFORD KENT**

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey and assessment of site physical characteristics of 10.4 hectares of land at Hermitage Quarry to the west of Maidstone in Kent. The survey was carried out during March 1998.

2 The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)¹ on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF). The work was carried out in order to determine the land quality and site physical characteristics of land affected by proposals to extend the existing quarry for ragstone extraction with subsequent restoration to agriculture. This survey supersedes any previous ALC information for this land.

3 The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF 1988). A description of the ALC grades and subgrades is given in Appendix I.

4 At the time of survey all of the agricultural land was in permanent pasture.

SUMMARY

5 The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale but any enlargement would be misleading.

6 The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1 below.

Table 1 Area of grades and other land

Grade/Other land	Area (hectares)	% site area
2	8.4	80.8
3a	2.0	19.2
Total Site Area	10.4	100.0

¹ FRCA is an executive agency of MAFF and the Welsh Office.

7 The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. In total 11 borings and one soil inspection pit were described.

8 The agricultural land on this site has been classified as Grade 2 very good quality and Subgrade 3a good quality, the key limitation being soil droughtiness, very occasionally in combination with soil wetness. The soils generally comprise well drained, fine and coarse loams derived from Hythe Beds (sandy limestone and calcareous sandstone deposits). The soils are generally impenetrable to the auger at variable depths due to the presence of stony horizons containing up to 50% brashy ragstone. The combination of soil properties and the prevailing climate acts to restrict the amount of water available in the profile for crops. As a result, the level and consistency of yields may be adversely affected. The relative depth and stoniness of the soils determines the severity of the soil droughtiness restriction, and thereby the ALC grade.

FACTORS INFLUENCING ALC GRADE

Climate

9 Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

10 The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met Office 1989).

Table 2 Climatic and altitude data

Factor	Units	Values
Grid reference		TQ 720 562
Altitude	m AOD	55
Accumulated Temperature	day C (Jan June)	1445
Average Annual Rainfall	mm	672
Field Capacity Days	days	138
Moisture Deficit Wheat	mm	114
Moisture Deficit Potatoes	mm	109
Overall climatic grade		Grade 1

11 The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

12 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR) as a measure of overall wetness and accumulated temperature (AT0 January to June) as a measure of the relative warmth of a locality.

13 The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. Other local climatic factors such as exposure and frost risk are not believed to have a significant effect on the site. The site is climatically Grade 1.

Site

14 The site lies at an altitude of 55–65m AOD with the land falling gently towards the north west. Nowhere on the site do gradient, microrelief or flood risk affect agricultural land quality.

Geology and soils

15 The most detailed published geological information (BGS 1976) maps the entire site as being underlain by Hythe Beds, sandy limestone and calcareous sandstone deposits.

16 The most detailed published soils information for this area (SSEW 1983) maps the Malling association across the entire site. These soils are described as being well drained, non calcareous, fine loamy soils over limestone at variable depths. Some deep, well drained, coarse loamy soils and similar fine loamy over clayey soils (SSEW 1983).

17 Upon detailed field examination, soils broadly consistent with the above description were found across the site. They were found to be well drained, fine and coarse loamy over brashy ragstone at variable depths below about 55cm.

AGRICULTURAL LAND CLASSIFICATION

18 The details of the classification of the site are shown on the attached ALC map and the are statistics for each grade are given in Table 1, page 1.

19 The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Grade 2

20 Land of very good quality has been mapped across much of the survey area. The principal limitation is minor soil droughtiness, with slight soil wetness being equally limiting on occasion.

21 Within the Grade 2 mapping unit, the topsoils consist of non calcareous, medium sandy silt loams or sandy clay loams. These may contain up to 10% total ragstone fragments (2.4% > 2cm in size). Upper subsoils comprise similar textures to the topsoils and generally pass to heavier textures such as heavy clay loam or clay in the lower subsoil, with occasional lighter horizons of sandy loam or loamy sand. Stone contents in the subsoil range from 5–30% total ragstone. Most profiles extend to at least 120cm, but occasional observations were found to be impenetrable to the soil auger at depths between 70 and 100cm. These soils are assessed as Wetness Class I or very occasionally II where slowly permeable clay horizons occur within 80cm depth. Moisture balance calculations, which take account of

horizons occur within 80cm depth. Moisture balance calculations which take account of these soil characteristics in relation to the local climatic regime suggest that these soils have slightly restricted reserves of available water. As a result the land suffers a minor droughtiness limitation and crop growth and yield may be adversely affected. Slight soil wetness is equally limiting on the rare occasion that slowly permeable clay horizons occur within 80cm. These cause drainage to be impeded such that the utilisation of the land is slightly restricted.

Subgrade 3a

22 Good quality land has been mapped along the southern edge of the site in association with land which experiences more significant soil droughtiness than elsewhere on the site.

23 Soils are similar to those described above in paragraph 21 the main distinction being that horizons of brashy ragstone are encountered at shallower depth. Soil pit 1 (see Appendix II) is typical of these soils. Medium sandy silt loam topsoils with 10-15% total ragstone (3% > 2cm in diameter) overlie medium sandy loam and sandy clay loam subsoils containing 5-15% ragstone. Profiles were impenetrable to the soil auger between 55 and 60cm. Evidence from soil pit 1 suggests that this is due to the presence of stony horizons containing 35-50% ragstone. Given the local climatic regime these stony soils have inadequate reserves of available water such that the land experiences a droughtiness restriction. Moisture balance calculations indicate that this restriction is consistent with land of Subgrade 3a quality.

SOIL RESOURCES

24 This section describes the soil resources identified on the site. It should be emphasised that this is not intended as a prescription for soil stripping but merely as an illustration of the soil resources available for restoration on the site. Due to the natural variability of soils the depths of topsoil and subsoil given should be treated with caution. Soils were sampled to a maximum depth of 120cm where possible during survey work. In some cases soil resources will extend below this depth. Textures described relate predominantly to hand texturing incorporating the results of laboratory analysis (particle size distribution) where taken.

Soil Units considerations for restoration

25 Given the fact that the soils are relatively uniform across the site and the site area is small one soil type has been identified.

Soil Unit 1

26 This unit covers an area of 10.4 hectares and comprises a medium sandy silt loam or sandy clay loam topsoil to a depth of 25-30cm. Subsoils comprise sandy clay loam or medium sandy loam to a depth of 50-120cm from the surface. The deeper variants are found towards the north of the site. Towards the south of the site lower subsoils which were found

to be impenetrable to the soil auger comprise more stony sandy clay loam heavy clay loam or clay to a depth of at least 120 cm as observed in pit 1 (see Appendix II) Occasional horizons of sandy loam or loamy sand were observed in the lower subsoil Soils are non calcareous throughout A description of a representative soil profile in this unit is given below

Representative soil profile for Soil Unit 1

Horizon	Average Depth (cm)	Description
Topsoil	0-30	medium sandy silt loam or sandy clay loam dark brown or brown (10YR 3/3 or 4/3) very slightly to slightly stony (2 15% ragstone) moderately developed coarse sub angular blocky structure friable
Subsoil	30-85	sandy clay loam or medium sandy loam brown or yellowish brown (10YR 5/3-5/4) usually with common ochreous mottles (7 5YR 5/8) very slightly to slightly stony (5 15% ragstone) moderately developed coarse angular blocky structure friable
Subsoil	85-120	sandy clay loam heavy clay loam or clay yellowish brown or light yellowish brown (10YR 5/4 6/4) usually with common ochreous mottles (7 5YR 5/8) slightly to very stony (10 50% ragstone) clay loam horizons = moderately developed coarse angular blocky structure friable clay horizons = weakly developed coarse sub angular blocky structure firm & slowly permeable

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SOURCES OF REFERENCE

British Geological Survey (1976) *Sheet No 288 Maidstone Solid & Drift Edition 1 50 000 scale* BGS London

Ministry of Agriculture Fisheries and Food (1988) *Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land* MAFF London

Met Office (1989) *Climatological Data for Agricultural Land Classification*
Met Office Bracknell

Soil Survey of England and Wales (1983) *Soils of England and Wales Sheet 6 Soils of South East England 1 250 000 scale and accompanying legend*
SSEW Harpenden.

APPENDIX I

DESCRIPTIONS OF THE GRADES AND SUBGRADES

Grade 1 Excellent Quality Agricultural Land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land of this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1 land.

Grade 3 Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a Good Quality Agricultural Land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b Moderate Quality Agricultural Land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 Very Poor Quality Agricultural Land

Land with severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

SOIL DATA

Contents

Sample location map

Soil abbreviations Explanatory Note

Soil Pit Descriptions

Soil boring descriptions (boring and horizon levels)

Database Printout Horizon Level Information

SOIL PROFILE DESCRIPTIONS EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database. This uses notations and abbreviations as set out below.

Boring Header Information

- 1 **GRID REF** national 100 km grid square and 8 figure grid reference
- 2 **USE** Land use at the time of survey. The following abbreviations are used

ARA	Arable	WHT	Wheat	BAR	Barley
CER	Cereals	OAT	Oats	MZE	Maize
OSR	Oilseed rape	BEN	Field beans	BRA	Brassicae
POT	Potatoes	SBT	Sugar beet	FCD	Fodder crops
LIN	Linseed	FRT	Soft and top fruit	FLW	Fallow
PGR	Permanent grass	LEY	Ley grass	RGR	Rough grazing
SCR	Scrub	CFW	Coniferous woodland	OTH	Other
DCW	Deciduous woodland	BOG	Bog or marsh	SAS	Set Aside
HTH	Heathland	HRT	Horticultural crops	PLO	Ploughed

- 3 **GRDNT** Gradient as estimated or measured by a hand held optical clinometer
- 4 **GLEYSPL** Depth in centimetres (cm) to gleying and/or slowly permeable layers
- 5 **AP (WHEAT/POTS)** Crop adjusted available water capacity
- 6 **MB (WHEAT/POTS)** Moisture Balance (Crop adjusted AP - crop adjusted MD)
- 7 **DRT** Best grade according to soil droughtiness
- 8 If any of the following factors are considered significant 'Y' will be entered in the relevant column

MREL	Microrelief limitation	FLOOD	Flood risk	EROSN	Soil erosion risk
EXP	Exposure limitation	FROST	Frost prone	DIST	Disturbed land
CHEM	Chemical limitation				

- 9 **LIMIT** The main limitation to land quality. The following abbreviations are used

OC	Overall Climate	AE	Aspect	ST	Topsoil Stoniness
FR	Frost Risk	GR	Gradient	MR	Microrelief
FL	Flood Risk	TX	Topsoil Texture	DP	Soil Depth
CH	Chemical	WE	Wetness	WK	Workability
DR	Drought	ER	Erosion Risk	WD	Soil Wetness/Droughtiness

Soil Pits and Auger Borings

- 1 **TEXTURE** soil texture classes are denoted by the following abbreviations

S	Sand	LS	Loamy Sand	SL	Sandy Loam
SZL	Sandy Silt Loam	CL	Clay Loam	ZCL	Silty Clay Loam
ZL	Silt Loam	SCL	Sandy Clay Loam	C	Clay
SC	Sandy Clay	ZC	Silty Clay	OL	Organic Loam
P	Peat	SP	Sandy Peat	LP	Loamy Peat
PL	Peaty Loam	PS	Peaty Sand	MZ	Manne Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:

F	Fine (more than 66% of the sand less than 0.2mm)
M	Medium (less than 66% fine sand and less than 33% coarse sand)
C	Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content:

M Medium (<27% clay) **H** Heavy (27-35% clay)

2 **MOTTLE COL** Mottle colour using Munsell notation

3 **MOTTLE ABUN** Mottle abundance expressed as a percentage of the matrix or surface described

F few <2% C common 2 20% M many 20 40% VM very many 40% +

4 **MOTTLE CONT** Mottle contrast

F faint indistinct mottles evident only on close inspection

D distinct mottles are readily seen

P prominent mottling is conspicuous and one of the outstanding features of the horizon

5 **PED COL** Ped face colour using Munsell notation

6 **GLEYS** If the soil horizon is gleyed a Y will appear in this column If slightly gleyed an S will appear

7 **STONE LITH** Stone Lithology one of the following is used

HR	all hard rocks and stones	FSST	soft fine grained sandstone
ZR	soft argillaceous or silty rocks	CH	chalk
MSST	soft medium grained sandstone	GS	gravel with porous (soft) stones
SI	soft weathered igneous/metamorphic rock	GH	gravel with non porous (hard) stones

Stone contents (>2cm >6cm and total) are given in percentages (by volume)

8 **STRUCT** the degree of development size and shape of soil peds are described using the following notation

Degree of development	WK	weakly developed	MD	moderately developed
	ST	strongly developed		
Ped size	F	fine	M	medium
	C	coarse		
Ped shape	S	single grain	M	massive
	GR	granular	AB	angular blocky
	SAB	sub angular blocky	PR	prismatic
	PL	platy		

9 **CONSIST** Soil consistence is described using the following notation

L loose	FM firm	EH extremely hard
VF very friable	VM very firm	
FR friable	EM extremely firm	

10 **SUBS STR** Subsoil structural condition recorded for the purpose of calculating profile droughtiness
G good M moderate P poor

11 **POR** Soil porosity If a soil horizon has less than 0.5% biopores >0.5 mm a Y will appear in this column

12 **IMP** If the profile is impenetrable to rooting a Y will appear in this column at the appropriate horizon

13 **SPL** Slowly permeable layer If the soil horizon is slowly permeable a Y will appear in this column

14 **CALC** If the soil horizon is calcareous a Y will appear in this column

15 Other notations

APW	available water capacity (in mm) adjusted for wheat
APP	available water capacity (in mm) adjusted for potatoes
MBW	moisture balance wheat
MBP	moisture balance potatoes

SAMPLE NO	GRID REF	ASPECT USE	--WETNESS --				WHEAT-		-POTS-		M REL		EROSN	FROST	CHEM	ALC	COMMENTS
			GRDNT	GLEYS	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT	
1	TQ71905630	PGR S	2	30	75	2	2	118	4	107	-2				WD	2	
2	TQ72005630	PGR S	2			1	1	155	41	107	-2				DR	2	
3	TQ72105630	PGR S	2			1	1	149	35	107	-2				DR	2	
4	TQ71905620	PGR E	2	24		1	1	122	8	107	-2				DR	2	
5	TQ72005620	PGR		65	65	2	1	104	-10	105	-4				DR	2	PROB 2 SEE1P
6	TQ72105620	PGR S	1			1	1	88	-26	93	-16				DR	2	PROB 2 SEE 1P
7	TQ71805610	PGR E	2	50	80	1	1	133	19	108	-1				DR	2	
8	TQ71905610	PGR NW	2			1	1	89	-25	92	-17				DR	3A	3A SEE 1P
9	TQ72005610	PGR NW	2			1	1	103	-11	110	1				DR	2	PROB 2
10	TQ72105610	PGR NW	2		85	1	1	128	14	102	-7				DR	2	
11	TQ71955600	PGR NW	2			1	1	82	-32	84	25				DR	3A	SEE 1P
1P	TQ71905610	PGR		93	93	1	1	121	7	98	11				DR	3A	

SAMPLE	DEPTH	TEXTURE	COLOUR	---MOTTLES---			PED COL	----STONES---			STRUCT/ CONSIST	SUBS			CALC	
				COL	ABUN	CONT		GLE	>2	>6		LITH	TOT	STR		POR
1	0-30	SCL	10YR33							0	0	HR	2			
	30-60	SCL	10YR5354	10YR58	C		Y	0	0	HR	5		M			
	60-75	SCL	10YR5456	75YR58	C		S	0	0	HR	10		M			
	75-100	C	10YR54	75YR58	M		S	0	0	HR	10		P		Y	
2	0-30	SCL	10YR33							0	0	HR	2			
	30-40	SCL	10YR54							0	0	HR	5		M	
	40-60	SCL	10YR54	75YR58	C		S	0	0	HR	5		M			
	60-75	MSL	10YR54	75YR58	C		S	0	0	HR	5		M			
	75-90	SCL	10YR54	75YR58	C		S	0	0	HR	5		M			
	90-120	LFS	10YR58							0	0	HR	5		G	
3	0-30	SCL	10YR33							0	0	HR	2			
	30-85	SCL	10YR54							0	0	HR	5		M	
	85-120	MSL	10YR54							0	0	HR	5		M	
4	0 24	MSZL	10YR3343							2	0	HR	8			
	24 50	SCL	10YR5354	10YR56	C F		Y	0	0	HR	10		M			
	50-95	HCL	10YR53	10YR56	C F		Y	0	0	HR	10		M			
	95-100	SCL	10YR5354							0	0	HR	30		M	IMP RAGSTONE
5	0 30	MSZL	10YR43							4	0	HR	10			
	30 50	SCL	10YR54							0	0	HR	10		M	
	50 65	HCL	10YR54	75YR58	C		S	0	0	HR	15		M			
	65-85	C	10YR64	75YR58	M		Y	0	0	HR	10		P		Y	IMP RAGSTONE
6	0-30	SCL	10YR33							0	0	HR	3			
	30-62	SCL	10YR54							0	0	HR	10		M	IMP RAGSTONE
7	0 28	MSZL	10YR4344							2	0	HR	8			
	28-50	SCL	10YR43	10YR46	C		S	0	0	HR	10		M			
	50-80	MCL	10YR53	10YR56	C		Y	0	0	HR	10		M			
	80-120	C	25Y 53	10YR58	M		Y	0	0	HR	5		P		Y	
8	0-30	MSZL	10YR43							3	1	HR	10			
	30-50	MSL	10YR44							0	0	HR	5		M	
	50 60	LMS	10YR5464							0	0	HR	15		G	IMP RAGSTONE
9	0 30	MSZL	10YR43							2	0	HR	5			
	30 48	MCL	10YR44							0	0	HR	5		M	
	48 70	MSL	10YR56	10YR58	C		S	0	0	HR	15		M		IMP RAGSTONE	
10	0 25	MSZL	10YR43							4	0	HR	10			
	25-45	MCL	10YR44							0	0	HR	15		M	
	45-55	MSL	10YR5456							0	0	HR	5		M	
	55 75	LMS	10YR5464							0	0	HR	2		G	
	75 85	MS	10YR64							0	0	HR	2		G	
	85 120	C	75YR56	10YR58	C		S	0	0	HR	10		P		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	---MOTTLES---			PED COL	----STONES----			STRUCT/ CONSIST	SUBS			SPL	CALC
				COL	ABUN	CONT		GLEY	>2	>6		LITH	TOT	STR		
11	0-30	MSZL	10YR43					3	2	HR	15					
	30-48	MSL	10YR4454					0	0	HR	5			M		
	48-55	MSL	10YR54					0	0	HR	15			M		IMP RAGSTONE
1P	0-30	MSZL	10YR43					3	0	HR	10	MDCSAB	FR			
	30-51	MSL	10YR54					0	0	HR	15	MDCOAB	FR M			
	51-76	SCL	10YR54	75YR58	C		S	0	0	HR	35	MDCOAB	FR M			
	76-93	SCL	10YR54	75YR58	C		S	0	0	HR	50			M		
	93-120	C	10YR6364	75YR58	M		Y	0	0	HR	10	WKCSAB	FM P	Y		Y