A2

LARKEY WOOD FARM, CHARTHAM, KENT

Agricultural Land Classification and Statement of Physical Characteristics

May 1999

Resource Planning Team
Eastern Region
FRCA Reading

RPT Job Number: 2002/038/99
FRCA Reference: EL 20/02088

AGRICULTURAL LAND CLASSIFICATION & STATEMENT OF SITE PHYSICAL CHARACTERISTICS

LARKEY WOOD FARM, CHARTHAM, KENT

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 19 hectares of land at Larkey Wood Farm, Chartham, Kent. The survey was carried out during May 1999.

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 subject to a planning application for proposed land raising, including an access road with associated planting bunds. 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 the agricultural land was mainly stubble from last seasons cereal crop. Some parts of the site have imported soil materials placed over the surface at approximately the locations shown on the accompanying maps. West of the byway running north to south (in the east of the site), these materials appear to been have spread at variable depths (usually a metre or less), whilst to the east of the byway the imported materials form continous heaps, estimated to be some 2-3 metres or more in height. Imported materials also form a raised linear feature up to approximately 0.5 metres in height running upslope from the southern corner of the site. The areas mapped as 'Other land' comprise farm tracks and storage areas for vehicles, dwellings and farm buildings.

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.

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

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
3b	13.5	100	69.6
Other land	1.1	N/A	5.7
Approx. extent of imported materials	4.8	N/A	24.7
Total surveyed area	13.5	100	-
Total site area	19.4	-	100

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. In total, 17 borings and 1 soil pit were described. Some limited observations were made within areas which have received imported soil materials. In these areas, the object was, where possible, to ascertain the nature of soils below the imported materials, as well as to obtain a broad impression of the nature of the imported materials.

8. Where graded, the agricultural land on the site has been classified as Subgrade 3b (moderate quality), with steep gradients and soil droughtiness the principal limitations. Observations made within the areas having imported materials to the west of the byway indicate that the soils beneath the imported layers are similar to those elsewhere on the site. The height of the soil heaps east of the byway were such that it was not possible to sample the soils beneath. The imported materials are variable in composition but comprise both mixed topsoil and subsoil materials which appear to be derived from chalk or clay with flint parent materials. Contamination with brick, metal and other rubble was noted at some locations.

9. Agricultural land on this site is characterised by steeply sloping ground having shallow, well drained soils resting over chalk. The majority of land on the site is limited in terms of agricultural land quality by steep gradients, typically in the range 8-11°. These will affect the safe and efficient use of agricultural machinery. In addition, the shallow soils over chalk have a relatively restricted available water capacity, which in the local climatic regime, causes the land to be drought-prone. This will adversely affect the level and consistency of crop yields, particularly in drier years.

FACTORS INFLUENCING ALC GRADE

Climate

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

11. 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	N/A	TR 119 550	TR 121 552	TR 123 550
Altitude	m, AOD	40	65	85
Accumulated Temperature	day°C (Jan-June)	1453	1424	1402
Average Annual Rainfall	mm	725	723	752
Field Capacity Days	days	151	149	154
Moisture Deficit, Wheat	mm	114	111	107
Moisture Deficit, Potatoes	mm	109	106	100
Overall climatic grade	N/A	Grade 1	Grade 1	Grade 1

12. 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.

13. 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.

14. 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 be significant at the site. The site is climatically Grade 1. The 150 field capacity day (FCD) isohyt passes through the area. Although this is an important factor in the ALC wetness assessment, the medium textured, well drained soils found on this site mean that this has no effect on the final grading at this location.

Site

15. The site lies on upper valley slopes of the River Stour valley at altitudes within the range 35-85m AOD. The land falls in a west or south westerly direction with gradients up to 15°, with most of the land having slopes of 8°-11°. With the exception of the higher land to the east of the site and some lower land to the extreme western corner, the majority of land on the site is limited to a maximum of Subgrade 3b on the basis of a gradient limitation. Above 7° there can be limitations on the range of agricultural machinery that can be safely and efficiently used, including precision seeding and harvesting equipment. Small slope facets were assessed as having gradients in the range 12-15°, in excess of the limits for Subgrade 3b. These were however, too small to form a separate mapping unit of a lower grade.

Geology and soils

16. The most detailed published geological information (British Geological Survey, 1978) shows the whole site as Upper Chalk.

17. The most detailed published soils information for this area (SSEW, 1983) shows the entire site to be mapped as soils of the Coombe 1 association. These soils are described as 'well drained calcareous fine silty soils, deep in valley bottoms, shallow to chalk on valley sides in places.

Slight risk of water erosion. The soils are similarly described in the Soils of Kent (SSEW, 1980)

AGRICULTURAL LAND CLASSIFICATION

18. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 2.

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.

Subgrade 3b

20. Land of moderate quality has been mapped over the site. Soils comprise well drained (wetness class I), calcareous profiles having medium silty clay topsoils which generally rest directly on a fissured and rootable chalk substrate. At occasional locations, generally on lower slopes where gradients are less, there is an intermediate pale chalky subsoil above the chalk. Topsoils are slightly stony with a total stone content up to 15% (by volume), comprising varying proportions of both flint and chalk stones. Where sampled, the content of flints did not exceed 8% (by volume) greater than 2cm in size. Pit 1, which is representative of soils on this site, was dug to investigate the nature and rootability of the underlying chalk. The pit evidence suggested that rooting was possible to a depth of about 40 cm into the chalk (i.e. about 65-75cm from the ground surface depending upon location), and this rooting depth was used to determine profile available water capacity for use in moisture balance calculations. These calculations indicate that soils on this site in the local climatic regime are moderately droughty and therefore appropriately placed in Subgrade 3b. Droughtiness will adversely affect the level and consistency of crop yields, particularly in drier years.

21. As discussed in paragraph 15, the majority of land on this site is also limited to Subgrade 3b due to a gradient limitation which affects the safe and efficient use of agricultural machinery.

SOIL RESOURCES

22. 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 or handling, but merely as an illustration of the soil resources available on the site. Due to the natural variability of soils, the depths of topsoil and subsoil given should be treated with caution. The aim was to sample soils to a maximum depth of 120 cm during survey work but because of the hardness of the underlying chalk depth this proved impossible. In some cases soil resources may 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

23. One soil unit (type) has been identified across the site. This primarily equates to the area given an Agricultural Land Classification grade. As far as can be ascertained the descriptions would

also be applicable to the in situ soils covered by imported materials, assuming the latter had been removed without damaging or diminishing the underlying resource.

Soil Unit 1

24. This unit covers an area of 13.5 hectares (or approximately 18.3 ha if the imported materials were to be removed) and comprises slightly stony calcareous medium silty clay loam topsoils typically resting directly over a fissured chalk bedrock. Observations based on pit 1, indicate that the chalk is fissured and rootable to at least 70cm from the ground surface. Table 3 gives a representative soil profile description.

Table 3: Representative soil profile for Soil Unit I

Horizon	Average Depth (cm)	Description
Topsoil	0–28	• calcareous medium silty clay loam • brown to greyish brown (10YR4/3-10YR5/3) • up to 15% total stone (flints and chalk) • sub-angular blocky structure (medium in size and moderately developed); • friable
Bedrock	29-70^{+}	• Blocky, fissured white chalk. Evidence of roots to 70cm.

Julie Holloway
Resource Planning Team
Eastern Region
FRCA Reading

SOURCES OF REFERENCE

British Geological Survey (1978) *Sheet No.289, Canterbury. 1:50,000 Solid and Drift Edition.* 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 (1980) *Bulletin 9, Soils of Kent. 1:250,000 Scale*

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

Soil Survey of England and Wales (1984) *Soils and their Use in South East England* 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:

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 pasture	**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. **GLEY/SPL**: 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
EX:	Exposure				

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:**	Marine 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. **GLEY**: 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	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	DRT	M.REL FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	TR12205540	ARA	NW	9			1	1	82	-30	88	-18	3B				GD	3B	3B SLOPE
2	TR12105530	ARA	NW	11			1	1	82	-31	88	-20	3B				GD	3B	BORDER 4
2A	TR12115529	ARA	NW	11						0		0				Y	WK	4	0-25=S/S
3	TR12005530	ARA	NW	9			1	2	93	-18	95	-10	3A				GR	3B	3B SLOPE
4	TR12005520	ARA	NW	15			1	1	90	-24	92	-17	3B				GR	4	4 SLOPE
5	TR12105520	ARA	W	8			1	1	86	-25	92	-14	3B				GD	3B	3B SLOPE
5A	TR12125520	ARA	NW	7			4	4		0		0				Y	WE	4	0-60=S/S
6	TR12205520	ARA	NW	2			1	1	87	-22	93	-10	3B			Y	DR	3B	SEE1P
7	TR11905510	ARA	NW	8			1	1	84	-30	90	-19	3B				GD	3B	SEE1P
8	TR12005510	ARA	NW	8			1	1	96	-17	98	-10	3A				GR	3B	3B SLOPE
9	TR12105510	ARA	NW	8			1	1	85	-26	91	-14	3B				GD	3B	SEE1P
10	TR12185510	ARA	W	5			1	1	82	-27	88	-15	3B				DR	3B	SEE1P
11	TR11905499	ARA	W	6			1	1	132	18	88	8	2				DR	2	
12	TR12005499	ARA	W	9			1	1	85	-27	91	-15	3B				GR	3B	3BSEE1P
13	TR12105490	ARA	W	8			1	1	84	-25	90	-13	3B				GR	3B	3BSEE1P
14	TR12195500	RGR	W	2			1	1		0		0					DR	3B	LIKE1P?
16	TR12005490	ARA	SW	9			1	1	91	-21	94	-12	3B				GD	3B	BORD3A DR
1P	TR12005540	ARA	NW	9			1	1	82	-32	88	-21	3B				GD	3B	3B SLOPE

				----MOTTLES-----			PED		----STONES----				STRUCT/	SUBS				
SAMPLE	DEPTH	TEXTURE	COLOUR	COL	ABUN	CONT	COL.	GLEY	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP	SPL	CALC	
1	0-25	MZCL	10YR43						2	0	HR	10						Y	
	25-70	CH							0	0		0						Y	
2	0-25	MZCL	10YR43						2	0	HR	10						Y	
	25-70	CH							0	0		0						Y	
2A	0-25	HCL	25Y 43	10YR56	C	D		Y	2	0	HR	10						Y	IMPORTED SS
	25-40	MZCL	10YR43						0	0	HR	10		M				Y	ORIGINAL TS
	40-45	CH							0	0		0						Y	
3	0-35	HZCL	10YR43						2	0	HR	10						Y	PROB.ORIGINAL TS
	35-40	CH							0	0		0						Y	
4	0-35	MZCL	10YR43						7	2	HR	15						Y	
	35-75	CH							0	0		0		P				Y	
5	0-30	MZCL	10YR43						2	0	HR	10						Y	
	30-70	CH							0	0		0		P				Y	
5A	0-60	C	10YR56		C	D		S	0	0		0						N	SS+ANAEROBIC TS
	60-78	MZCL	10YR42						0	0		0						Y	UNDISTURBED TS
	78-80	CH							0	0		0						Y	
6	0-28	MZCL	10YR52						3	1	HR	5						Y	ORIGINAL TS
	28-70	CH							0	0		0		P				Y	
7	0-29	MZCL	10YR42						8	3	HR	12						Y	
	29-70	CH							0	0		0		P				Y	
8	0-28	MZCL	25Y42						3	0	HR	3						Y	
	28-35	MZCL	25Y63						0	0	HR	5		M				Y	
	35-75	CH							0	0		0		P				Y	
9	0-27	MZCL	25Y42						6	1	HR	6						Y	
	27-70	CH							0	0		0		P				Y	
10	0-25	MZCL	10YR43						2	0	HR	10						Y	
	25-70	CH							0	0		0						Y	
11	0-26	MZCL	10YR53						3	0	HR	8						Y	
	26-71	MZCL	25Y 54						0	0	CH	10		M				Y	
	71-110	CH	10YR81						0	0	HR	2		P				Y	
12	0-28	MZCL	10YR53						4	0	HR	9						Y	
	28-70	CH	10YR81						0	0	HR	2		P				Y	
13	0-25	MZCL	10YR53						2	0	HR	6						Y	
	25-120	CH	10YR81						0	0	HR	2		P				Y	

AMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	CALC	
14	0-20	MZCL	10YR43						0	0		0						Y	IMP FLINTS
16	0-28	MZCL	10YR42						5	0	HR	10						Y	
	28-35	MZCL	25Y 63						0	0	HR	10						Y	
	35-75	CH							0	0		0						Y	
1P	0-25	MZCL	10YR43						2	0	HR	15	MDMSAB	FR				Y	2%HR 13%CH
	25-70	CH	05Y 81						0	0		0			P				