

LEA CASTLE FARM, WOLVERLEY
AGRICULTURAL LAND CLASSIFICATION SURVEY

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LEA CASTLE FARM, WOLVERLEY

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 55.1ha of land at Lea Castle Farm, Wolverley. Field survey was based on 54 auger borings and 5 soil profile pits, and was completed in April 1998. During the survey 4 samples were analysed for particle size distribution (PSD).
2. The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in connection with an application for a proposed golf course.
3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. Apart from the published regional ALC map (MAFF, 1977), which shows the site at a reconnaissance scale as wholly Grade 3 the site had not been surveyed previously. A previous survey (ADAS, 1987) was carried out on land adjacent to the current site, south of Wolverley Road, and west of Heathfield and Court Farm. This survey showed the land to be Subgrade 3a and Subgrade 3b. However, the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.
4. At the time of survey land cover was grass, barley and set aside. Other land which was not surveyed included farm buildings, woodland and tracks.

SUMMARY

5. The distribution of ALC grades is shown on the accompanying 1:10000 scale ALC map. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas. Areas are summarised in the Table 1.

Table 1: Distribution of ALC grades: Lea Castle Farm

Grade	Area (ha)	% Surveyed Area (55.1ha)
2	17.5	31.8
3a	29.2	53.0
3b	6.0	10.9
Other land	<u>2.4</u>	<u>4.4</u>
Total site area	55.1	100.0

6. The majority of the site has been graded as best and most versatile land, with two isolated areas of Subgrade 3b land in the north west and centre of the site. The Grade 2 quality land is found in the north east around Lea Castle Farm, and as two isolated areas along the southern boundary, north of South Lodges and Four Winds. These soils were found to be sandy and limited by soil droughtiness. The Subgrade 3a land occurs across the majority of the site. The soils were described as sandy over sandstone in the east and sandy but stony in the west, these soils are also limited by soil droughtiness. The land of Subgrade 3b quality occurs in the north west of the site and as an isolated area at Broom Covert. In both cases the soils were found to be stony and limited in their agricultural use by soil droughtiness.

CLIMATE

7. Estimates of climatic variables for this site were derived from the published agricultural climate dataset “Climatological Data for Agricultural Land Classification” (Meteorological Office, 1989) using standard interpolation procedures. Data for key points around the site are given in Table 2 below.
8. Since the ALC grade of land is determined by the most limiting factor present, overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions. Parameters used for assessing overall climate are accumulated temperature, a measure of relative warmth and average annual rainfall, a measure of overall wetness. The results shown in Table 2 indicate that there is no overall climatic limitation.
9. Climatic variables also affect ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes, which are compared with the moisture available in each profile in assessing soil droughtiness limitations. These are described in later sections.

Table 2: Climatic Interpolations: Lea Castle Farm

Grid Reference	SO 841791	SO843789	SO846790
Altitude (m)	73	80	61
Accumulated Temperature (day °C)	1413	1405	1426
Average Annual Rainfall (mm)	690	693	685
Overall Climatic Grade	1	1	1
Field Capacity Days	156	156	155
Moisture deficit (mm):			
Wheat	99	98	100
Potatoes	88	87	90

RELIEF

10. Altitude ranges from 84 metres at Broom Covert in the south of the site to 55 metres in the south east corner of the site along the A449 Wolverhampton Road.
11. The site is undulating but there are no slopes that affect the grade of the land. There may be a slight risk of water and wind erosion from some of these soils particularly on the gentle slopes in the east of the site.

GEOLOGY AND SOILS

12. The underlying geology of the site is shown on the published geology map (IGS, 1949) as Triassic Bunter sandstone across the east and in the extreme west of the site, and glacial 4th Terrace River gravels in the west.
13. In the recent survey, the western half of the site was found to be underlain by river gravels, and in the east by sand onto sandstone.
14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as the Bridgnorth series over the east of the site with Newport series over the rest of the site. More detailed information is also available in the 1:25000 scale survey of the Worcestershire area (SSEW 1974).
15. The soils of the Newport Association are described as deep well drained sandy soils. The Bridgnorth Soil Association is described as having well drained sandy and coarse loamy soils over soft sandstone.
16. In the recent ALC survey, soils were found to be well drained and sandy in the east of the site, but across the rest of the site, the well drained sandy soils were stony and passed onto river terrace gravels.

AGRICULTURAL LAND CLASSIFICATION

17. The distribution of ALC grades found by the current survey is shown on the accompanying 1:10000 scale map and areas are summarised in Table 1. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas.

18. Grade 2

Land of very good quality was identified in the north east of the site, around Lea Castle Farm, and as two isolated areas along the southern boundary of the site. These soils were described as having a sandy loam topsoil texture overlying loamy sand subsoils and passing onto sand to depth. The soils are generally stoneless and confirmed by a soil profile pit to be limited by soil droughtiness.

19. **Subgrade 3a**

Land of good quality was identified across the majority of the site, but can be distinguished by different parent materials. In the west, across the area described as the 4th River Terrace, the sandy loam topsoils overlay loamy sand subsoils and sand to depth. The soils were slightly stony and it was confirmed by a soil profile pit that the main limitation to these soils was soil droughtiness. In the east where the geology is described as Triassic Bunter sandstone, the soils were found to have sandy loam or loamy sand topsoils, which overlay loamy sand or sand subsoils, generally passing into well weathered, relatively soft sandstone. Again a soil profile pit confirmed the soils to be limited by soil droughtiness.

20. **Subgrade 3b**

Land of moderate quality occurs across the site in two isolated areas, one in the north west and a small area at Broom Covert. The soils were described as having slightly to moderately stony, sandy loam topsoil textures overlying moderately stony, loamy sand subsoils and moderately stony sand to depth. Two soil profile pits confirmed that the soils were limited by soil droughtiness.

21. **Other land**

Other land on the site includes farm buildings including a livery yard and stables, woodland and tracks.

S Y HUNTER
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April 1998

REFERENCES

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APPENDIX I

DESCRIPTION OF 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 include 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 and horticultural crops can usually be grown but on some land in the 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.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where 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 level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In most 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 very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Source: MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land, MAFF Publications, Alnwick.

APPENDIX II

DEFINITION OF SOIL WETNESS CLASSES

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile.

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but not wet within 40 cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31 and 90 days in most years.

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

Notes: The number of days specified is not necessarily a continuous period.

'In most years' is defined as more than 10 out of 20 years.

Source: Hodgson, J M (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe.

APPENDIX III

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1997).

1. Terms used on computer database, in order of occurrence.

GRID REF: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

WHT:	Wheat	SBT:	Sugar Beet	HTH:	Heathland
BAR:	Barley	BRA:	Brassicas	BOG:	Bog or Marsh
OAT:	Oats	FCD:	Fodder Crops	DCW:	Deciduous Wood
CER:	Cereals	FRT:	Soft and Top Fruit	CFW:	Coniferous Woodland
MZE:	Maize	HRT:	Horticultural Crops	PLO:	Ploughed
OSR:	Oilseed Rape	LEY:	Ley Grass	FLW:	Fallow (inc. Set aside)
POT:	Potatoes	PGR:	Permanent Pasture	SAS:	Set Aside (where known)
LIN:	Linseed	RGR:	Rough Grazing	OTH:	Other
BEN:	Field Beans	SCR:	Scrub		

GRDNT: Gradient as estimated or measured by hand-held optical clinometer.

GLEY, SPL: Depth in centimetres to gleying or slowly permeable layer.

AP (WHEAT/POTS): Crop-adjusted available water capacity.

MB (WHEAT/POTS): Moisture Balance. (Crop adjusted AP - crop potential MD)

DRT: Best grade according to soil droughtiness.

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				

LIMIT: The main limitation to land quality: The following abbreviations are used.

OC:	Overall Climate	AE:	Aspect	EX:	Exposure
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
ST: Topsoil Stoniness		

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)

MOTTLE COL: Mottle colour using Munsell notation.

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%+

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.

PED. COL: Ped face colour using Munsell notation.

GLEYS: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

STONE LITH: Stone Lithology - One of the following is used.

HR: All hard rocks and stones	SLST: Soft oolitic or dolimitic limestone
CH: Chalk	FSST: Soft, fine grained sandstone
ZR: Soft, argillaceous, or silty rocks	GH: Gravel with non-porous (hard) stones

MSST: Soft, medium grained sandstone **GS:** Gravel with porous (soft) stones
SI: Soft weathered igneous or metamorphic rock

Stone contents are given in % by volume for sizes >2cm, >6cm and total stone >2mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

Degree of development **WA:** Weakly developed Adherent **WK:** Weakly developed
MD: Moderately developed **ST:** Strongly developed

Ped size **F:** Fine **M:** Medium
C: Coarse **VC:** Very coarse

Ped Shape **S:** Single grain **M:** Massive
GR: Granular **AB:** Angular blocky
SAB: Sub-angular blocky **PR:** Prismatic
PL: Platy

CONSIST: Soil consistence is described using the following notation:

L: Loose **VF:** Very Friable **FR:** Friable **FM:** Firm
VM: Very firm **EM:** Extremely firm **EH:** Extremely Hard

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

VIS: Visual **S:** Sieve **D:** Displacement

MOTTLE SIZE:

EF: Extremely fine <1mm	M: Medium 5-15mm
VF: Very fine 1-2mm>	C: Coarse >15mm
F: Fine 2-5mm	

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (OM) or grey (GM).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' should also be noted.

MANGANESE CONCRETIONS: Assessed by volume

N: None	M: Many	20-40%
F: Few <2%	VM: Very Many	>40%
C: Common 2-20%		

POROSITY:

P: Poor - less than 0.5% biopores at least 0.5mm in diameter
G: Good - more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per 100cm ² :	Very Fine and Fine	Medium and Coarse
F: Few	1-10	1 or 2
C: Common	10.25	2 - 5
M: Many	25-200	>5
A: Abundant	>200	

ROOT SIZE

VF: Very fine <1mm	M: Medium 2 - 5mm
F: Fine 1-2mm	C: Coarse >5mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp: <0.5cm	Gradual: 6 - 13cm
Abrupt: 0.5 - 2.5cm	Diffuse: >13cm
Clear: 2.5 - 6cm	

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*

* See Soil Survey Field Handbook (Hodgson, 1997) for details.

Profile Gleyed From: 35	Available Water	Wheat:	126mm	Final ALC Grade:	3b
Slowly Permeable Horizon From: 35	Potatoes:		103mm	Main Limiting Factor(s):	We
Wetness Class: IV	Moisture Deficit	Wheat:	104mm		
Wetness Grade: 3b			96mm		
	Potatoes:				
	Moisture Balance	Wheat:	+22mm		
			+7mm		
	Potatoes:				
			(Calculated to 120 cm)		
	Droughtiness Grade: 2				
				Remarks: H3. Clay structure determined by structure of mudstone rather than pedogenic development.	
				Water visible into pit on all sides between H1 and H2.	

SITE NAME Lea Castle Farm Wolverley		PROFILE NO. Pit 2 (ASP31)		SLOPE AND ASPECT 1° N		LAND USE Cer		Av Rainfall: 689 mm ATO: 1419 day °C		PARENT MATERIAL 4th Terrace River gravels	
JOB NO. 40/98		DATE 2-4-98		GRID REFERENCE SO 8880 7900		DESCRIBED BY SH, SK		FC Days: 156 Climatic Grade: 1 Exposure Grade:-		PSD SAMPLES TAKEN None	
Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size
1.	38	MSL	75YR3/2-3/3	0% >2cm 3% <2cm 3% HR(s+d)	none	none	MD CSAB -MDMSAB	FR	G	G	CF+VF
2	45	LMS	75YR 3/4-4/4	14% HR (s+d)	none	none	WK CPL	FR	M	G	FF+VF
3.	58	LMS	75YR3/4-4/4	14%HR (s+d)	none	none	MDCAB	VF	G	G	FF+VF
4.	84	MS	5YR4/4	0%	none	none	WKCSAB	VF	M	G	FVF
5.	120	LMS	5YR4/4	43% >2cm 6% <2cm 49% HR (s+d)	none	none	Too stony	VF	M	G	-

Profile Gleyed From: -

Slowly Permeable Horizon From: -

Wetness Class: 1

Wetness Grade: 1

Available Water Wheat: 96 mm

Potatoes 85 mm

Moisture Deficit Wheat 100mm

Potatoes 89mm

Moisture Balance Wheat: -4 mm

Potatoes -4 mm

Droughtiness Grade: :3a (Calculated to 120cm)

Final ALC Grade: 3a

Main Limiting Factor(s) DR

Remarks:
H2 structure due to compaction from machinery.
H2 + H3 same soil profile horizon but distinguished by change in structure.

SITE NAME Lea Castle Farm Wolverley		PROFILE NO. Pit 3 (ASP18)		SLOPE AND ASPECT 3°N		LAND USE PGR		Av Rainfall: 691 mm ATO: 1409 day °C		PARENT MATERIAL Triassic Bunter Sandstone	
JOB NO. 40/98		DATE 6/4/98		GRID REFERENCE SO 845792		DESCRIBED BY SH/SK		FC Days: 156 Climatic Grade: 1 Exposure Grade: -		PSD SAMPLES TAKEN TS 0-25cm – LMS / MSL s:78%, z:15%, c:7%.	
Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size
1	37	MSL /LMS	75YR3/2-3/3	1%HR(vis)	none	none	-	-	-	G	CF+VF
2	67	LMS	75YR3/4	none	none	none	MDCSAB	VF	G	G	FF+VF
3	89	MS	5YR4/4	none	none	none	WKCPL breaking to WK CAB	VF	M	G	FVF
4	120	MS	25YR4/6	none	none	none	WKCPL	VF	M	G	FVF

Profile Gleyed From:	-	Available Water	Wheat:	108mm	Final ALC Grade: 2 using MSL topsoil
Slowly Permeable Horizon From:	-		Potatoes	93mm	
Wetness Class:	1	Moisture Deficit	Wheat	98mm	Remarks: H2 - at top of horizon a 5-8cm band of CPL stru
			Potatoes	87 mm	
Wetness Grade:	1	Moisture Balance	Wheat:	10mm	
			Potatoes	5mm	
		Droughtiness Grade	:2	(Calculated to 120 cm)	