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MILTON KEYNES EXPANSION STUDY
Land at Stocking Green Farm, Hanslope

Agricultural Land Classification
ALC Map and Report

January 1999

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Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION SUMMARY REPORT

MILTON KEYNES EXPANSION STUDY
LAND AT STOCKING GREEN FARM, HANSLOPE.

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 7 ha of land at Stocking Green Farm, Hanslope. The survey was carried out during January 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). It was carried out in connection with MAFF's statutory input to The Milton Keynes Expansion Study. 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 use on the site comprised permanent pasture with an area of autumn sown cereals to the north-west. The areas mapped as 'Other land' include a road, a drainage lagoon and an area on which building materials had been stored.

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.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
3b	6.8	100	94.4
Other land	0.4	-	5.6
Total surveyed area	6.8	100	94.4
Total site area	7.2	-	100

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

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

8. The entire site is classified as Subgrade 3b (moderate quality agricultural land) with soil wetness as the principal limitation. The soils comprise heavy clay loam topsoils over clay subsoils which significantly impede soil drainage. Soil wetness reduces the versatility of the land in terms of access by machinery (e.g. for cultivations or harvesting) and grazing by livestock if damage to the soil is to be avoided. The heavy topsoils enhance this restriction. Soil wetness will also adversely affect seed germination and root growth and will therefore reduce the level and consistency of yields.

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	N/A	SP 803473	SP 802475
Altitude	m, AOD	110	113
Accumulated Temperature	day°C (Jan-June)	1363	1359
Average Annual Rainfall	mm	659	658
Field Capacity Days	days	140	140
Moisture Deficit, Wheat	mm	103	103
Moisture Deficit, Potatoes	mm	93	93
Overall climatic grade	N/A	Grade 1	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. The site is climatically Grade 1. However, climatic factors do interact with soil properties to influence soil wetness at this site. The site is not subjected to adverse local climatic factors such as frost or exposure, or to flooding events.

Site

14. The site lies between approximately 110 m and 113 m. The site is virtually flat. The slopes on the site are very gentle from the north-west to the south-east and do not, therefore, adversely affect land quality.

Geology and soils

15. The most detailed published geological information for the site (BGS, 1969) shows the entire site to be underlain by glacial Boulder Clay overlying Blisworth Clay (Great Oolite Clay).

16. The most detailed published soils information covering the area (SSEW, 1983) shows the site to comprise soils of the Hanslope association. These are described as 'Slowly permeable calcareous clayey soils and some slowly permeable non calcareous clayey soils' (SSEW, 19983) . Soils consistent with this description (in particular, slowly permeable calcareous soils) were found over the entire site.

AGRICULTURAL LAND CLASSIFICATION

17. 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.

18. 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

19. Land of moderate quality has been mapped across the entire site. The principal limitation is soil wetness. The soils on the site are characterised by the soil pit, 1P.

20. The soils on the site are of a single type. They comprise non-calcareous heavy clay loam topsoils which overlie non calcareous, slowly permeable clay upper subsoils passing to calcareous clay lower subsoils. The profiles all present evidence of seasonal waterlogging in the form of gleying within 40 cm. Severely impeded drainage arises from the presence of poorly structured slowly permeable horizons which commence in the range 20-30 cm. The topsoils and the upper subsoils contain up to 5% flints by volume. The calcareous lower subsoils contain between approximately 5 and 15% chalk by volume.

21. Under the prevailing local climatic conditions the observed drainage characteristics equate to Wetness Class IV which, when considered in conjunction with the topsoil textures, results in a Subgrade 3b classification across the site. Excessive soil wetness may adversely crop growth and development. It can also limit the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock. In essence, the versatility of the land is restricted by the soil conditions present on site.

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SOURCES OF REFERENCE

British Geological Survey (1969) *Sheet No.202, Towcester, 1:63,360, Solid and Drift Ed.* 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) *Sheet 6, Soils of South-East England, 1:250,000.* 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	ASPECT USE	GRDNT	GLEY	SPL	WETNESS CLASS	WETNESS GRADE	WHEAT AP	WHEAT MB	POTS AP	POTS MB	M.REL DRT	EROSN FLOOD	FROST EXP	CHEM DIST	ALC LIMIT		COMMENTS
1	SP80204750	CER		28	28	4	3B	105	2	103	10	3A				WE	3B	
2	SP80104740	CER		25	25	4	3B	103	0	101	8	3A				WE	3B	
3	SP80204740	CER		28	28	4	3B	97	-6	102	9	3A				WE	3B	
4	SP80314737	PGR		26	26	4	3B	94	-9	99	6	3A				WE	3B	1P LOC
5	SP80244729	PGR		30	30	4	3B	106	3	104	11	3A				WE	3B	
6	SP80324729	PGR		25	25	4	3B	89	-14	100	7	3A				WE	3B	
7	SP80404730	PGR		27	27	4	3B	83	-20	89	-4	3A				WE	3B	
1P	SP80314737	PGR		20	20	4	3B	122	19	99	6	2				WE	3B	@ASP4

SAMPLE	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	SUBS CALC	
1	0-28	HCL	10YR42						1	0	HR	3							
	28-65	C	25Y 53	10YR56	C	D	FEW MN	Y	0	0	HR	2			P		Y		
	65-90	C	25Y 61 62	10YR68	M	D		Y	0	0	CH	10			P		Y	Y	
2	0-25	HCL	10YR42						1	0	HR	3							
	25-50	C	25Y 52	10YR68	M	D	COM MN	Y	0	0	HR	3			P		Y		
	50-90	C	25Y 61	10YR68	M	D		Y	0	0	CH	10			P		Y	Y	
3	0-28	HCL	10YR42						1	0	HR	3							
	28-80	C	25Y 52 53	10YR58	M	D	FEW MN	Y	0	0	HR	3			P		Y		PLASTIC
4	0-26	HCL	10YR32						0	0	HR	5							
	26-60	C	25Y 61	10YR58	M	D		Y	0	0	HR	5			P		Y		
	60-80	C	25Y 71	10YR66	M	D		Y	0	0	HR	10			P		Y	Y	
5	0-30	HCL	10YR41						0	0	HR	3							
	30-60	C	25Y 53	10YR56	C	D		Y	0	0		0			P		Y		
	60-90	C	25Y 52 62	10YR58	M	D	FEW MN	Y	0	0	CH	5			P		Y	Y	
6	0-25	HCL	10YR31						0	0	HR	2						Y	
	25-70	C	25Y 53	10YR58	M	D	FEW MN	Y	0	0	HR	5			P		Y	Y	PLASTIC
7	0-27	HCL	10YR32						0	0	HR	2							
	27-60	C	25Y 63	10YR58	M	D		Y	0	0	HR	5			P		Y		
1P	0-20	HCL	10YR32	10YR46	F	D			0	0	HR	5							
	20-60	C	25Y 52	10YR68	M	D		Y	0	0		0	MDCPR	FM	P	Y	Y		
	60-120	C	25Y 61	10YR58	M	D		Y	0	0	CH	15	WKCAB	FM	P	Y	Y	Y	