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**MILTON KEYNES EXPANSION STUDY
Land at Edgewick Farm, Woburn Sands**

**Agricultural Land Classification
ALC Map and Report**

January 1999

**Resource Planning Team
Eastern Region
FRCA Reading**

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AGRICULTURAL LAND CLASSIFICATION REPORT

MILTON KEYNES EXPANSION STUDY LAND AT EDGEWICK FARM, WOBURN SANDS

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 10 ha of land at Edgewick Farm, Woburn Sands, near Milton Keynes. 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). The survey 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 land use on the site was permanent grassland. The areas mapped as 'Other land' include an area of woodland, a small landscaped amenity area and some 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.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	6.2	73.8	66.7
3b	2.2	26.2	23.7
Other land	0.9	N/A	9.7
Total surveyed area	8.4	100.0	90.3
Total site area	9.3	-	100.0

7. The fieldwork was conducted at an average density of 1 boring per hectare of land. In total, 11 borings and 2 soil pits were described.

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

8. The agricultural land at this site has been classified as Grade 2 and Subgrade 3b. The principal limitations to agricultural quality are soil droughtiness and soil wetness, although there are areas within the site that are limited by steep gradients.
9. The land classified as Grade 2 (very good quality agricultural land) has both soil droughtiness and soil wetness limitations. Typical soil profiles comprise non-calcareous medium sandy loams over similar subsoils. In some instances, these become coarser textured (loamy medium sand and medium sand) with depth or otherwise the clay content increases to give sandy clay loam lower subsoils. Soils range from well to imperfectly drained, due to either fluctuating groundwater or less permeable lower horizons. The high sand content aids workability but makes some soils on the site drought-prone, which may adversely affect the level and consistency of yields.
10. The land classified as Subgrade 3b (moderate quality agricultural land) is predominantly limited by soil wetness. However, there are areas which are limited by slope, mainly confined to the north-eastern and the south-western part of the southern unit adjacent to Wavendon Wood, where steep gradients are sufficient to affect the range of mechanised operations that can be safely and efficiently carried out. Where slope is not limiting, the land has a significant soil wetness limitation due to high groundwater levels. Soil wetness reduces both the range of crops which can be grown and the overall 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. 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

11. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.
12. 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). The climatic variables from grid reference SP 925 354 have been used in this report.

Table 2: Climatic and altitude data

Factor	Units	Values		
		SP 923 353	SP 925 354	SP 926 355
Grid reference	N/A	SP 923 353	SP 925 354	SP 926 355
Altitude	m, AOD	125	109	100
Accumulated Temperature	day°C (Jan-June)	1348	1366	1377
Average Annual Rainfall	mm	629	626	624
Field Capacity Days	days	130	129	129
Moisture Deficit, Wheat	mm	103	105	106
Moisture Deficit, Potatoes	mm	94	96	98
Overall climatic grade	N/A	Grade 1	Grade 1	Grade 1

13. 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.
14. 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 (ATO, January to June), as a measure of the relative warmth of a locality.
15. The combination of rainfall and temperature at this site means that there is no overall climatic limitation. In addition, the site does not suffer from significant exposure or frost risk. As such, the site may be considered as being climatically Grade 1. Climatic factors do however interact with soil properties to influence soil wetness and soil droughtiness.

Site

16. The survey area lies between 100 and 125m AOD. The land over most of the site gently falls in a southwest-northeast direction, following a valley along the eastern site boundary. However, there are small areas within the site, to the extreme south and also along the north-eastern boundary, where slopes of between 8 and 10° were measured. These slopes are sufficient to affect the range of mechanised operations that can be safely and efficiently carried out. However, nowhere on the site do microrelief or flooding restrict agricultural land quality.

Geology and soils

17. The most detailed published geological information for the area (BGS, 1992) maps most of the survey area as Head deposits. However, there are areas, predominantly to the west of the site, that are mapped as Oxford Clay, Woburn Sands and Fuller's Earth.
18. The most detailed published soils information for the area (SSEW, 1983) shows the site to be covered by two soil associations. Along the western fringe of the site, the Oxpasture association is mapped. These are described as 'Fine loamy over clayey and clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some slowly permeable seasonally waterlogged clayey soils' (SSEW, 1983). The remainder of the site is mapped as the Frilford association. These are described as 'Deep well-drained sandy and coarse loamy soils. Some ferruginous sandy and coarse loamy soils affected by groundwater. Risk of water erosion' (SSEW, 1983). Detailed survey work found that soils across the majority of the site were similar to those described as the Frilford association.

AGRICULTURAL LAND CLASSIFICATION

19. 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 1.
20. 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

21. Land of Grade 2 classification (good quality agricultural land) has been mapped across most of the surveyed area. Soils in this classification unit have either a minor soil wetness or soil droughtiness limitation, depending on soil profile characteristics. Where there is a droughtiness limitation, profiles typically comprise non-calcareous, well drained (Wetness Class I) stoneless, medium sandy loam topsoils over similar upper subsoils, over loamy medium sand lower subsoils. Some profiles were gleyed, usually at depth, due to fluctuating groundwater levels. Those profiles where droughtiness is the overriding limitation are typified by Pit 1P. Moisture balance calculations indicated that the light textured topsoils and subsoils are sufficient to cause a slight reduction in the reserves of available water in the soil. In the comparatively dry local climate, this acts to impart a minor soil droughtiness limitation, which may lower the level and consistency of crop yields or reduce crop quality compared to land of higher quality.
22. Where soil wetness is limiting, typically on lower land within the mapping unit, profiles comprise non-calcareous, stoneless, medium sandy loam topsoils over similar textured upper subsoils, over sandy clay loam lower subsoils. However, the depth to which the sandy clay loam horizon appears in the profile varies across the site. Profiles were gleyed within 40cm. Such profiles were typified by Pit 2P. Evidence from the pit suggests that the sandy clay loam horizon is slowly permeable and therefore inhibits downward water movement through the profile. Consequently, Wetness Class III is applicable, given that it was found to occur between 25 and 60cm, which in combination with the workable medium sandy loam topsoils, means the land is placed in Grade 2. The drainage impedance is sufficient to give a slight restriction on access to the land for cultivations and/or grazing. Although a wide range of crops can be grown on this land, the imperfect drainage may cause crop yields to be less consistent than on land of higher quality.
23. Occasional profiles of Grade 1 quality were observed within the Grade 2 area, but these were too sporadic to form a discrete mapping unit.

Subgrade 3b

24. Land of Subgrade 3b (moderate agricultural quality) occurs predominantly to the south of the site, but also on the north-eastern fringe towards Hardwick Road. The main limitations are soil wetness and gradient. Where soil wetness is limiting, in the south of the site, the land shows evidence of locally poor drainage, with small seepage areas and soft, boggy patches. In the local climate, Wetness Class V is considered appropriate for these sporadic seepage areas and the land has been classified as being no better than Subgrade 3b overall. Although some of the land will be better draining than this, the wet areas form a pattern limitation which will adversely affect the management of the remaining area. The extent of this soil wetness would be sufficient to cause a restriction on access to the land for cultivations and/or grazings if damage to the soil is to be avoided. It would also limit the range of crops that could be grown and lower the consistency of yields.
25. In some parts of the Subgrade 3b mapping unit, along the north-eastern boundary and in the extreme south, gradient is the overriding limitation to agricultural productivity. Gradients of between 8 and 10° were measured in these areas, which are sufficient to place the land in

Subgrade 3b. Where gradient is limiting, the safe and efficient use of agricultural machinery, based on the use of two-wheel drive machines, is limited, due to loss of wheel grip and increased risk of sliding.

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SOURCES OF REFERENCE

British Geological Survey (1992) *Sheet No. 220, Leighton Buzzard, 1:50,000 Solid and Drift*.
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.

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 and soil boring descriptions (boring and horizon levels)

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. **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
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. **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

ZR: soft, argillaceous, or silty rocks

MSST: soft, medium grained sandstone

SI: soft weathered igneous/metamorphic rock

FSST: soft, fine grained sandstone

CH: chalk

GS: gravel with porous (soft) stones

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

VF: very friable

FR: friable

FM: firm

VM: very firm

EM: extremely firm

EH: extremely hard

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 EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB					
1	SP92603550	PGR E	3	65 65	2	1	153	48	111	15	1				
2	SP92683546	PGR		28	2	1	158	53	114	18	1			1	WET@100
3	SP92503540	PGR NE	1		1	1	130	25	99	3	2			DR	2 1P LOCATION
4	SP92603540	PGR		25 25	3	2	155	50	117	21	1			WE	2 SEE 2P
5	SP92403530	PGR NE	2		1	1	127	22	108	12	2			DR	2 SEE 1P
6	SP92503530	PGR E	2	60 90	2	1	151	46	111	15	1				1
7	SP92603530	PGR		30 30	3	2	156	51	115	19	1			WE	2 SEE 2P WET@90
8	SP92403520	PGR SW	4	28 65	2	2	142	37	115	19	1			WE	2 WET@80
9	SP92503520	PGR E	2	28 60	3	2	152	47	111	15	1			WE	2 2P LOCATION
10	SP92403510	PGR		28	5	4	121	16	101	5	2			WE	4 GROUND WATER
11	SP92363528	PGR		75 75	2	1	141	36	110	14	1				1
1P	SP92503540	PGR NE	1		1	1	125	5	94	-2	2			DR	2 1P LOCATION
2P	SP92503520	PGR		28 55	3	2	151	46	112	16	1			WE	2 PIT 100 AUG120

SAMPLE	DEPTH	TEXTURE	COLOUR	-----MOTTLES-----			PED		-----STONES-----				STRUCT/		SUBS		SPL	CALC
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP		
1	0-30	MSL	10YR43						0	0		0						
	30-65	MSL	10YR44						0	0	HR	2		M				
	65-120	SCL	10YR53	10YR58	C	D		Y	0	0		0		M		Y	SEE 2P	
2	0-28	MSL	10YR43						0	0		0						
	28-65	MSL	10YR53	10YR58	C	D		Y	0	0		0		M				
	65-120	MSL	10YR52	10YR58	C	D		Y	0	0		0		M				
3	0-27	MSL	10YR43						0	0		0						
	27-50	MSL	10YR44						0	0	HR	2		M				
	50-75	MSL	10YR44						0	0		0		M				
	75-120	LMS	10YR44						0	0		0		G			SEE 1P	
4	0-25	MSL	10YR43						0	0		0						
	25-80	SCL	10YR53	10YR68	C	F		Y	0	0		0		M		Y	SEE 2P Q MSL	
	80-120	SCL	10YR53	10YR68	C	D		Y	0	0		0		M		Y	SEE 2P	
5	0-28	MSL	10YR43						0	0		0						
	28-65	MSL	10YR44						0	0		0		M				
	65-90	LMS	10YR44						0	0		0		G			SEE 1P	
	90-120	MS	10YR44						0	0		0		G			SEE 1P	
6	0-28	MSL	10YR43						0	0		0						
	28-60	SCL	10YR53						0	0	HR	2		M				FRIABLE
	60-90	SCL	10YR44	10YR58	C	D		S	0	0	HR	2		M				FRIABLE
	90-120	SCL	10YR53	10YR58	C	D		Y	0	0		0		M		Y	SEE 2P	
7	0-30	MSL	10YR42	10YR56	C	D		Y	0	0		0						
	30-55	SCL	10YR52	10YR56 58	C	D		Y	0	0		0		M		Y	LOW POROSITY	
	55-90	MCL	05Y 62	10YR56	C	D		Y	0	0		0		M		Y		
	90-120	MSL	05Y 62	10YR56	C	D		Y	0	0		0		M				
8	0-28	MCL	10YR43						0	0		0						
	28-65	HCL	10YR44	10YR56	C	D		S	0	0		0		M				FRIABLE
	65-120	C	25Y 62	10YR68	M	D		Y	0	0		0		P		Y		
9	0-28	MSL	10YR43						0	0		0						
	28-60	MSL	10YR53	10YR58	C	D		Y	0	0		0		M				
	60-120	SCL	10YR53	10YR58	C	D		Y	0	0		0		M		Y		
10	0-28	QMSL	10YR32	10YR56	C	D		Y	0	0		0						WET
	28-55	MSL	05Y 61 62	10YR56 58	M	D		Y	0	0		0		M				WET
	55-120	MS	05Y 62	10YR58	C	D		Y	0	0		0		M				WET
11	0-25	MSL	10YR42						0	0		0						
	25-75	SCL	10YR43						0	0		0		M				
	75-120	SC	10YR53 61	10YR58	C	D		Y	0	0		0		P		Y	PLASTIC	

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----		PED	----STONES----			STRUCT/	SUBS						
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP	SPL
1P	0-25	MSL	10YR43						0	0	0						
	25-40	MSL	10YR44						0	0	0	MDCSAB	FR	M			
	40-67	LMS	10YR44						0	0	0	MDCSAB	FR	G			
	67-120	LMS	10YR52	10YR58	C	D		Y	0	0	0	MDCAB	FR	G			WET@95
2P	0-28	MSL	10YR44						0	0	0						
	28-55	MSL	10YR53	10YR58	C	D		Y	0	0	0	MDCSAB	FR	M			FRIABLE
	55-120	SCL	10YR52	10YR58	68	C	D	Y	0	0	0	MDCAB	FR	M	Y		LOW POROSITY