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**DIDCOT DEVELOPMENT 2001 - 2011
LOCAL PLANNING STUDY
Site A, Alma Barn
Agricultural Land Classification
Reconnaissance Survey
ALC Map and Report**

October 1997

**Resource Planning Team
Eastern Region
FRCA Reading**

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AGRICULTURAL LAND CLASSIFICATION REPORT

DIDCOT DEVELOPMENT 2001 - 2011 LOCAL PLANNING STUDY SITE A, ALMA BARN

RECONNAISSANCE SURVEY

INTRODUCTION

1. This report presents the findings of a reconnaissance Agricultural Land Classification (ALC) survey of 33.3 hectares of land at Alma Barn on the south-western edge of Didcot in Oxfordshire. The survey was carried out during October 1997.
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), in connection with the Didcot Local Planning Study for the period 2001 to 2011. This survey supersedes any previous ALC information for this land. It is adjacent to two surveys carried out by FRCA (formerly Statutory ADAS) in 1996 (FRCA Refs: 3304/001/96 & 3303/168/96).
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 predominantly winter sown cereal, with one small orchard. The areas mapped as 'Other land' include agricultural buildings, houses and their associated gardens and an agricultural track.

SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:20,000. 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, overleaf.
7. The fieldwork was conducted at an average density of 1 boring for every 4 hectares of agricultural land. A total of 13 borings and 2 soil pits were described.
8. The agricultural land on this site has been classified as Grade 2, very good quality, and Subgrade 3a, good quality. The limitations to agricultural use are soil droughtiness and/or soil wetness.

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
2	7.3	22.8	21.9
3a	24.7	77.2	74.2
Other land	1.3	-	3.9
Total surveyed area	32.0	100	-
Total site area	33.3	-	100

9. Soils comprise fine loamy and fine silty textures which typically become heavier with depth and pass to clay in the subsoil. These soils are derived from deposits of Upper Greensand, and as such contain variable amounts of fine soft sandstone and commonly rest on flaggy sandstone within 1 metre. The clayey subsoils impede soil drainage, thereby causing seasonal waterlogging and soil wetness restrictions. The depth to clay determines the degree of soil wetness, and thereby the ALC grade. In addition, much of the land experiences a soil droughtiness problem arising from profile stoniness and relatively shallow soil depth over sandstone which restricts rooting. Such factors act to limit the amount of soil moisture which may be available to a growing crop. The extent of this soil droughtiness restriction is consistent with Grade 2 and Subgrade 3a quality land.

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	
		SU 504 895	SU 503 888
Grid reference		SU 504 895	SU 503 888
Altitude	m, AOD	80	75
Accumulated Temperature	day°C (Jan-June)	1429	1435
Average Annual Rainfall	mm	586	588
Field Capacity Days	days	124	125
Moisture Deficit, Wheat	mm	114	114
Moisture Deficit, Potatoes	mm	108	109
Overall climatic grade		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 have a significant effect on the site. The site is climatically Grade 1. Climatic factors do however affect soil droughtiness and soil wetness and at this locality the climate is relatively warm and dry in regional terms. The likelihood of soil droughtiness problems is thereby enhanced.

Site

15. The site lies at an altitude of 75-80 metres AOD, with land falling very gently from north to south. Across all of the site gradient, microrelief and flood risk do not affect agricultural land quality.

Geology and soils

16. The most detailed published geological information (BGS, 1971) shows the entire site to be underlain by Upper Greensand.

17. The most detailed published soils information for this area (SSEW, 1983) shows all of the site to comprise soils of the Harwell association, these being described as 'well drained loamy soils over sandstone, with some slowly permeable, seasonally waterlogged fine loamy or fine silty over clayey soils.' (SSEW, 1984).

18. Upon detailed field examination, soils across the site were found to be broadly consistent with the description for Harwell association. They were found to be fine loamy and fine silty over clay in the lower subsoils and resting over brashy sandstone at variable depths.

AGRICULTURAL LAND CLASSIFICATION

19. 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.

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. Very good quality land occurs along the south-eastern edge of the site. The land has very minor soil droughtiness limitations.

22. The soils within the Grade 2 mapping units were found to comprise deep generally well drained profiles (wetness class I). Non-calcareous topsoils of medium silty clay loam

texture contain up to 2% total fine sandstone fragments . These rest on heavy (silty) clay loam and clay subsoils which generally become heavier with depth and are stonefree. Mottling and gleying in the subsoil is evident from 45-60cm depth, suggesting that drainage is imperfect. This is due to the presence of slowly permeable clay lower subsoils which slightly impede soil drainage. However, the depth to these horizons is such that most of the profile drains freely.

23. These soil characteristics combine with the dry climatic conditions to give rise to land which has minor soil droughtiness restrictions. The volume of soil moisture available to growing crops is not quite sufficient to meet demand such that plants may suffer slight drought stress. The level and consistency of yields may be adversely affected.

Subgrade 3a

24. Good quality land occurs across most of the site. The land is limited by soil droughtiness and/or soil wetness.

25. Soils comprise medium, or occasionally heavy, clay loam topsoils containing up to 10% fine sandstone fragments, typically passing to heavy (silty) clay loam in the immediate upper subsoil and clay lower subsoils. Subsoils contain up to 35% sandstone fragments. Many profiles were found to be impenetrable to the soil auger between 45 and 85cm depth due to the presence of hard brashy sandstone. Soil pits 1 and 2 are representative of these soils (see Appendix II). Roots were found to penetrate the sandstone by only about 10cm. This land is affected by soil droughtiness which arises through the interaction of soil factors, especially high stone contents and restricted rooting into the sandstone, with the prevailing climate, which is relatively dry. Moisture balance calculations indicate that soil moisture reserves are unlikely to be adequate in meeting demand in most years. The agronomic effects of this are to restrict the range of crops which can be grown, as well as adversely affecting yield potential.

26. Occasional profiles also show signs of impeded soil drainage. Where this is the case, the land is also affected by soil wetness restrictions. Soils are gleyed between 30 and 48cm and slowly permeable below 46cm. Such drainage status equates to wetness class II or III, which when combined with heavy topsoil textures, results in Subgrade 3a being appropriate on the basis of soil wetness. This degree of soil wetness may affect crop yields as well as restricting the opportunities for cultivations and/or grazing.

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SOURCES OF REFERENCE

British Geological Survey (1971) *Sheet No. 253, Abingdon, Drift Edition, 1:63,360 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.

Soil Survey of England and Wales (1984) *Soils and their use in South-East England.*
SSEW: Harpenden.

APPENDIX I

DESCRIPTION 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 (eg. 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 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

- GRID REF:** national 100 km grid square and 8 figure grid reference.
- 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	DCW: Deciduous Wood
HTH: Heathland	BOG: Bog or Marsh	FLW: Fallow
PLO: Ploughed	SAS: Set aside	OTH: Other
HRT: Horticultural Crops		
- GRDNT:** Gradient as estimated or measured by a hand-held optical clinometer.
- GLEYSPL:** Depth in centimetres (cm) to gleying and/or slowly permeable layers.
- AP (WHEAT/POTS):** Crop-adjusted available water capacity.
- MB (WHEAT/POTS):** Moisture Balance. (Crop adjusted AP - crop adjusted 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		

Soil Pits and Auger Borings

- 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)
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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	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/metamorphic rock	

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:

<u>degree of development</u>	WK: weakly developed	MD: moderately developed
	ST: strongly developed	
<u>ped size</u>	F: fine	M: medium
	C: coarse	VC: very coarse
<u>ped shape</u>	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	FROST	CHEM	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	
1	SU50208945	CER SW	01	028 068	2	2	118	4	109	0	3A			DR 3A	Imp 85
1P	SU50108940	CER NW	01	046 046	2	3A	100	-14	107	-2	3A			WD 3A	
2	SU50408950	CER W	01		1	1	085	-29	085	-24	3B			DR 3A	Imp 50, see 2p
2P	SU50308920	CER NW	01	047	1	1	098	-16	106	-3	3A			DR 3A	
3	SU50108940	CER N	01	048 048	2	3A	099	-15	110	1	3A			WE 3A	Imp 72, see 1p
4	SU50308940	CER W	01		1	1	074	-40	074	-35	3B			DR 3A	
5	SU50508940	CER		045	1	1	099	-15	105	-4	3A			DR 3A	See Pit 2
6	SU50108920	CER NW	01	030	2	2	088	-26	090	-19	3B			DR 3a	see Pit 2
7	SU50308920	CER NW	01	045	1	1	097	-17	104	-5	3A			DR 3A	See Pit 2
8	SU50508920	CER N	01	045 045	2	2	107	-7	115	6	3A			DR 3A	Imp 75
9	SU50608910	CER		060 100	1	1	145	31	121	12	1				1
10	SU50108900	CER NW	01	030 060	2	2	121	7	107	-2	2			WD 2	IMP 110
11	SU50308900	CER		032 032	3	3A	094	-20	106	-3	3A			WE 3A	
12	SU50508900	CER		045 085	1	1	128	14	122	13	2			DR 2	IMP 100
13	SU50308885	CER		032 032	3	3B	094	-20	106	-3	3A			WE 3B	HCL topsoil

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES----			STRUCT/ CONSIST	SUBS			SPL	CALC
				COL	ABUN	CONT		GLEYS	>2	>6		LITH	TOT	STR		
1	0-28	mc1	25 Y31 00					4	0	0	FSST 10					
	28-68	hc1	25 Y52 00	10YR58	00	C		Y	0	0	FSST 10		M			
	68-85	c	05 Y62 00	10YR58	00	C		Y	0	0	FSST 10		P		Y	
	85-120	fsst	05 Y62 00					Y	0	0	0		P		Y	Imp 85, fsst
1P	0-32	hc1	25 Y41 00					0	0	0	FSST 2					
	32-46	c	05 Y52 00					0	0	0	FSST 2	MDCSAB	FR	M		
	46-65	c	05 Y52 00	10YR58	00	C		Y	0	0	FSST 10	STCOAB	VM	P	Y	Y
	65-74	c	05 Y52 72	10YR58	00	C		Y	0	0	FSST 35		P	Y	Y	
	74-80	fsst	05 Y72 00	10YR58	00	C		Y	0	0	0		P			Roots to 80
2	0-30	mc1	10YR31 00					0	0	0	FSST 2					
	30-50	hc1	25 Y42 00					0	0	0	FSST 2		M			Imp, hard fsst
2P	0-30	mc1	25 Y41 00					0	0	0	FSST 2					
	30-47	hc1	25 Y42 00	75YR46	00	F		0	0	0	FSST 2	MDCSAB	FR	M		
	47-60	hc1	25 Y42 00	75YR46	00	C		Y	0	0	FSST 2	MDCSAB	FR	M		
	60-70	fsst	05 Y72 00					Y	0	0	0		P			Roots to 70
3	0-32	hc1	10YR31 00					2	0	0	FSST 4					
	32-48	c	05 Y52 00	10YR58	00	F		0	0	0	0		M			
	48-70	c	05 Y52 00	10YR58	00	C		Y	0	0	0		P		Y	
	70-72	c	05 Y52 00	75YR58	00	M		Y	0	0	FSST 20		P		Y	Imp, hard fsst
4	0-30	mc1	10YR31 00					3	0	0	FSST 7					
	30-45	hc1	25 Y51 52	10YR58	00	F		0	0	0	FSST 10		M			Imp, hard fsst
5	0-30	mzc1	10YR32 00					0	0	0	0					
	30-45	hc1	10YR41 00					0	0	0	0		M			
	45-55	hc1	25Y 42 00	000C00	00	C		Y	0	0	0		M			
	55-60	hc1	25Y 63 00	000C00	00	C		Y	0	0	0		M			Imp, hard fsst
6	0-30	mc1	10YR31 00					0	0	0	FSST 2					
	30-55	hc1	05 Y52 72	25 Y56	00	C		Y	0	0	FSST 10		M			Imp, hard fsst
7	0-30	mc1	10YR31 00					0	0	0	FSST 2					
	30-45	hc1	25 Y42 00	75YR46	00	F		0	0	0	0		M			
	45-62	hc1	25 Y42 00	75YR46	00	C		Y	0	0	0		M			Imp, hard fsst
8	0-30	mzc1	10YR32 00					0	0	0	0					
	30-45	hzc1	10YR52 00					0	0	0	0		M			
	45-75	c	25 Y52 00	10YR58	00	C		Y	0	0	0		P		Y	Imp, hard fsst
9	0-32	mzc1	10YR32 00					0	0	HR	1					
	32-60	hc1	25Y 53 00					0	0	0	0		M			
	60-100	c	25Y 63 00	000C00	00	C		Y	0	0	0		M			
	100-120	c	25Y 63 00	000C00	00	C		Y	0	0	0		P		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES----			STRUCT/ CONSIST	SUBS			SPL	CALC
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR	POR		
10	0-30	mc1	10YR31 00						3	0	FSST	8					
	30-60	hc1	05 Y52 00	10YR58 00	C				Y	0	0	FSST	10		M		
	60-110	c	05 Y52 72	10YR58 00	M				Y	0	0	FSST	20		P		Y
11	0-32	mc1	10YR32 00						0	0	FSST	2					
	32-70	c	25Y 53 00	000C00 00	M				Y	0	0	0			P	Y	Y
12	0-35	mzc1	10YR32 00						0	0	FSST	2					
	35-45	c	10YR52 00						0	0	0				M		
	45-70	c	25Y 63 00	000C00 00	M				Y	0	0	0			M		
	70-85	c	25Y 52 00	000C00 00	M				Y	0	0	0			M		
	85-100	c	25Y 52 00	000C00 00	M				Y	0	0	0			P	Y	Y
13	0-32	hc1	10YR41 00						0	0	FSST	2					
	32-70	c	25Y 52 00	000C00 00	C				Y	0	0	0			P	Y	Y