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Buckinghamshire Structure Plan Review
LAND SOUTH OF WINSLOW

Agricultural Land Classification
ALC Map and Report

June 1999

Resource Planning Team
Eastern Region
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AGRICULTURAL LAND CLASSIFICATION REPORT

BUCKINGHAMSHIRE STRUCTURE PLAN REVIEW
LAND SOUTH OF WINSLOW

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 12 ha of land to the east of Granborough Road on the southern edge of Winslow, Buckinghamshire. The survey was carried out during June 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 Buckinghamshire Structure Plan Review. Information from land adjacent to the present site was used in the grading (FRCA Ref. 0301/131/96). This survey supersedes any previous ALC information for this site.

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 permanent grassland, with ley grassland in the south. The areas mapped as 'Other land' include areas of woodland, public rights of way, garage storage areas and a former clay pit. The latter may have some occasional grazing.

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
3a	6.1	56.5	50.0
3b	4.7	43.5	38.5
Other land	1.4	N/A	11.5
Total surveyed area	10.8	100.0	88.5
Total site area	12.2	-	100.0

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

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. A total of 14 borings was described.

8. The land has been classified as Subgrade 3a (good quality agricultural land) and Subgrade 3b (moderate quality). The principal limitation across the site is soil wetness. The Subgrade 3a soils typically comprise medium clay loam topsoils overlying heavy clay loam upper subsoils passing to clay lower subsoils. The clay subsoils significantly restrict drainage of water through the profile causing the wetness limitation. The Subgrade 3b soils typically comprise heavier topsoils (heavy clay loams) lying directly over clay subsoils, hence the wetness limitation is more severe. As a result, land such as this will have a restriction on the number of days in which agricultural operations can be carried out. In addition, the level and consistency of yields may be adversely affected.

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	SP767272
Altitude	m, AOD	100
Accumulated Temperature	day°C (Jan-June)	1384
Average Annual Rainfall	mm	675
Field Capacity Days	days	142
Moisture Deficit, Wheat	mm	104
Moisture Deficit, Potatoes	mm	95
Overall climatic grade	N/A	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. Local factors such as exposure and frost risk are also not believed to be significant. The site is climatically Grade 1.

Site

14. The site lies in the range 92-105m. The land in the extreme south is flat-lying; elsewhere it slopes gently to the south. Nowhere do microrelief or flood risk affect the land quality.

Geology and soils

15. There is no recent geological information for this area. The 1864 map indicates Oxford Clay as the most likely underlying geology, though it may be complicated by deposits of boulder clay.

16. The most recent published soils information (SSEW, 1983) shows the site to compose of two soil associations. The predominant soil association is Denchworth. These soils are described as 'Slowly permeable seasonally waterlogged soils with similar fine loamy over clayey soils. Some fine loamy over clayey soils with only slight seasonal waterlogging and some slowly permeable calcareous clayey soils' (SSEW, 1983). In the north of the site, soils of the Ashley Association are mapped. These are described as 'Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils' (SSEW, 1983). Detailed survey work found soils similar to those described here.

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 is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Subgrade 3a

19. The higher land in the north of the site has been placed in this grade, linking in with Subgrade 3a land on the adjacent site to the east. Soils typically comprise medium clay loam topsoils over heavy clay loam upper subsoils, passing to clay lower subsoils. There was evidence from the borings of soil wetness, in the form of gleying above 40 cm. Using information from pit 1P (FRCA Ref. 0301/131/96), the clay lower subsoils were shown to be slowly permeable and impart a restriction on the downward movement of water through the profile. As such, these soils are imperfectly drained (Wetness Class III) which, in combination with prevailing field capacity days (142 days) and topsoil texture, means a classification of Subgrade 3a is appropriate. The wetness limitation will restrict the number of days when soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock. In addition, the level and consistency of yields will be affected.

Subgrade 3b

20. Land in this subgrade typically lies on the lower land across the site, linking with Subgrade 3b land on the adjacent site to the west. Soils in this unit typically comprise gleyed heavy clay loam topsoils lying directly over gleyed, slowly permeable clay subsoils, similar to pit 3P (FRCA Ref. 0301/131/96). Since the wetness limitation in these soils is more

severe, Wetness Class IV is appropriate. In combination with the local climate and topsoil textures, the soils are placed in Subgrade 3b. The wetness limitation on this land will have a greater impact on access and yields than land in the Subgrade 3a unit.

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SOURCES OF REFERENCE

British Geological Survey (1864) *Sheet No.46 NW*
GSGB, 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.
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	M.REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SP76702740	PGR	S	2	30	45	3	3A	113	9	111	16	2				WE	3A	SEE 1P 131/96
2	SP76802740	PGR	SW	3	000	40	3	3A	98	-6	103	8	3A				WE	3A	DITTO
3	SP76902740	PGR			25	40	3	3A	102	-2	107	12	3A				WE	3A	DITTO
4	SP76702730	PGR			25	50	3	3A	134	30	111	16	1				WE	3A	DITTO
5	SP76802730	PGR	W	2	30	30	4	3B	101	-3	106	11	3A				WE	3B	SEE 3P 131/96
6	SP76902730	PGR			25	45	3	3A	104	0	109	14	3A				WE	3A	SEE 1P 131/96
7	SP76702720	PGR	S	3	28	28	4	3B	100	-4	105	10	3A				WE	3B	SEE 3P 131/96
8	SP76802720	PGR	SE	2	35	65	3	3A	141	37	118	23	1				WE	3A	SEE 1P 131/96
9	SP76902720	PGR	S	2	35	35	4	3B	101	-3	106	11	3A				WE	3B	SEE 3P 131/96
10	SP76602710	PGR			28	28	4	3B	100	-4	105	10	3A				WE	3B	DITTO
11	SP76702710	PGR			25	25	4	3B	99	-5	104	9	3A				WE	3B	DITTO
12	SP76802710	PGR			35	35	4	3B	90	-14	96	1	3A				WE	3B	I60 SEE3P 131/
13	SP76602700	LEY			30	30	4	3B	101	-3	106	11	3A				WE	3B	SEE 3P 131/96
14	SP76702700	LEY			30	30	4	3B	101	-3	106	11	3A				WE	3B	DITTO

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	0-30	MCL	10YR43						0	0		0							
	30-45	HCL	10YR42	10YR58	C	D		Y	0	0		0		M					
	45-90	C	25Y53	10YR5868	M	D		Y	0	0		0		P			Y		
2	0-26	MCL	10YR32	10YR58	C	D		Y	0	0		0							
	26-40	C	25Y 52	10YR58	C	D		Y	0	0		0		M					FRIABLE
	40-80	C	25Y 5363	10YR5868	C	D		Y	0	0	HR	2		P			Y	Y	
3	0-25	MCL	10YR42	10YR58	C	D		Y	0	0		0							
	25-40	C	25Y 53	10YR58	C	D		Y	0	0	HR	2		M					
	40-80	C	25Y 5363	10YR568	C	D		Y	0	0	HR	2		P			Y	Y	
4	0-25	MCL	10YR43						0	0		0							
	25-50	HCL	10YR42	10YR58	C	D		Y	0	0		0		M					
	50-90	C	25Y 52	75YR48	M	D		Y	0	0		0		P			Y		
	90-120	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y		
5	0-30	HCL	10YR42	10YR58	C	D		Y	0	0		0							
	30-50	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y		Q SPL BORDER 3A
	50-80	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y	Y	PLASTIC
6	0-25	MCL	10YR43						0	0		0							
	25-45	HCL	10YR43	10YR58	C	D		Y	0	0	HR	2		M					
	45-80	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y	Y	
7	0-28	HCL	10YR42	10YR58	C	F		Y	0	0		0							
	28-80	C	25Y 53	10YR58	C	D		Y	0	0		0		P			Y	Y	PLASTIC
8	0-35	MCL	10YR43						0	0		0							
	35-65	HCL	10YR42	10YR58	C	D		Y	0	0		0		M					
	65-80	C	25Y 5363	10YR58	C	D		Y	0	0		0		P			Y	Y	
	80-120	C	05Y 51	10YR58	C	D		Y	0	0		0		P			Y	Y	
9	0-20	MCL	10YR43						0	0		0							
	20-35	HCL	10YR42						0	0		0		M					
	35-80	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y	Y	
10	0-28	HCL	10YR42	10YR58	C	D		Y	0	0		0							
	28-80	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y	Y	
11	0-25	HCL	10YR42	10YR56	C	D		Y	0	0		0							
	25-80	C	25Y 53	10YR5658	C	D		Y	0	0		0		P			Y	Y	
12	0-35	HCL	10YR42	10YR58	C	D		Y	0	0		0							
	35-60	C	25Y 53	10YR5868	C	D		Y	0	0		0		P			Y		
13	0-30	HCL	10RY42	10YR58	C	D		Y	0	0		0							
	30-80	C	25Y 5253	10YR5658	M	D		Y	0	0		0		P			Y		

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC
14	0-30	HCL	10YR42	10YR58	C	F		Y	0	0		0						
	30-80	C	25Y 5363	10YR5868	M	D		Y	0	0		0		P			Y	