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PROPOSED LEISURE CENTRE BICESTER, OXFORDSHIRE

Agricultural Land Classification ALC Map and Report

October 1997

Resource Planning Team
Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

PROPOSED LEISURE CENTRE
BICESTER, OXFORDSHIRE

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 10 5 ha of land on the south western edge of Bicester in Oxfordshire Additionally 19 ha of land to the north west and south of the Proposed Leisure Centre was surveyed at semi detailed level The total area investigated amounted to 29 5 ha The survey was carried out during September 1997

2 The work 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 an ad hoc planning application for a leisure centre and hotel 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 majority of the land had been harvested for barley and the fields were in stubble The remaining fields were in permanent grassland and were being grazed by sheep There were two small areas mapped as Other land and these included a small copse and a disused allotment

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 of surveyed land are summarised in Table 1A and Table 1B

7 The fieldwork was conducted at an average density of 1 borings per hectare of agricultural land for the area of the planning application the adjacent land was surveyed in semi detail (less than 1 boring per hectare) A total of 22 borings and 1 soil pit was described a number of topsoil stone measurements were also made

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

Table 1A Area of grades and other land surveyed Application Site (detailed survey)

Grade/Other land	Area (hectares)	/ surveyed area	/ site area
3b	8 6	84 3	81 9
4	1 6	15 7	15 2
Other land	0 3	N/A	2 9
Total surveyed area	10 2	100	97 1
Total site area	10 5		100

Table 1B Total area of grades and other land surveyed

Grade/Other land	Area (hectares)	% surveyed area	% site area
3b	27 3	93 5	92 6
4	1 9	6 5	6 4
Other land	0 3	N/A	1 0
Total surveyed area	29 2	100	99 0
Total site area	29 5		100

8 The majority of the land has been assessed as Subgrade 3b (moderate quality land) with soil wetness topsoil stoniness and microrelief as the main limitations Where soil wetness is significant clay topsoils overlie poorly structured clay subsoils which significantly restrict the drainage of these heavy soils and limit the range of cropping and the flexibility of the land Some of the soils are developed on Cornbrash geology which has given rise to localised areas where patches of flaggy limestone impede cultivation crop growth and harvesting Land in the extreme north west experiences a significant microrelief limitation, possibly related to previous disturbance

9 The remainder of the site in the north east has been mapped as Grade 4 (poor quality land) with a severe wetness limitation Here wet organic soils around a spring support an area of wet vegetation

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)

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

Table 2 Climatic and altitude data

Factor	Units	Values		
Grid reference	N/A	SP 574 218	SP 574 222	SP 574 218
Altitude	m, AOD	70	70	70
Accumulated Temperature	day°C (Jan June)	1425	1425	1425
Average Annual Rainfall	mm	661	663	661
Field Capacity Days	days	143	143	143
Moisture Deficit, Wheat	mm	106	105	106
Moisture Deficit Potatoes	mm	97	97	97
Overall climatic grade	N/A	1	1	1

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 (ATO 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 In addition local climatic factors such as exposure and frost risk, do not affect land quality at this location The site is climatically Grade 1

Site

15 The site lies in the altitude range of approximately 65–75 m AOD The highest land is found to the north west falling gently towards the south east of the site Nowhere on the site do gradient microrelief or flooding affect the land quality

Geology and soils

16 The most detailed published geological information for the site (BGS 1863) shows the majority of the land to be underlain by Cornbrash with Forest Marble outcropping along the course of a stream in the north, and Oxford Clay on the lower land in the south east

17 The most detailed published soils information covering the area (SSEW 1983) shows it to comprise soils of the Wickham 2 association These soils are described as slowly permeable seasonally waterlogged fine loamy over clayey fine silty over clayey and clayey soils (SSEW 1984) Soils consistent with this description were observed across the site fine loamy or fine silty over clay subsoils or clayey soils throughout the profile

AGRICULTURAL LAND CLASSIFICATION

18 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 Tables 1A and 1B on page 1

19 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

20 Moderate quality agricultural land is mapped across the majority of this site Limitations include soil wetness topsoil stoniness and microrelief Although some profiles were of a better quality these were variable and thus they did not constitute a mapping unit in their own right

21 Within the detailed survey area the site has been mapped as suffering from a significant soil wetness limitation Soil inspection pit 1P (see Appendix II) is representative of these soils These profiles are characteristically deep predominantly non calcareous with some localised calcareous soils and are less permeable with depth Topsoils were very slightly stony (1–5% by volume) to slightly stony (6–15% by volume) clay or heavy clay loams These overlie heavier clay upper subsoils some of which are gleyed The clay lower subsoils consistently showed signs of gleying caused by impeded drainage resulting from the presence of a slowly permeable horizon starting at depths from between 28 and 56 cm Such drainage characteristics equate to Wetness Class III or IV (depending on the depth to the slowly permeable layer) which, when considered alongside the heavy topsoil textures and the prevailing climatic conditions results in a land classification of Subgrade 3b Agriculturally Subgrade 3b land with a soil wetness restriction results in land producing moderate yields of a narrow range of crops or lower yields of a wider range of crops In addition the sensitivity of soil to structural damage determines the number of days when the soil is in a suitable condition for cultivation trafficking by machinery or grazing by livestock

22 Close to the Other land category a small area was also affected by a topsoil stone limitation restricting land quality to Subgrade 3b Topsoil stone measurements of between 16 20% (>2cm) were recorded The effect of this is to act as an impediment to cultivation, harvesting and crop growth

23 Outside the detailed area, in the north west land with a microrelief limitation was mapped probably related to the presence of previously disturbed land In addition, land quality in the semi detailed area was also affected by a variable topsoil limitation

Grade 4

24 A small area of poor quality agricultural land suffering from a severe wetness limitation was mapped in the north of the detailed survey area Here wet organic soils around a spring and stream support an area of wet vegetation This degree of soil wetness will significantly affect the flexibility of the land particularly in terms of the number of days when the area is suitable for cultivation, grazing by livestock or trafficking by machinery without causing structural damage to the soil

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SOURCES OF REFERENCE

British Geological Survey (1863) *Sheet No 45 SE Bicester*
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*
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 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	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	CALC
1	0 30	MCL	10YR53						0	0	SLST	10						Y
3	0 20	MCL	10YR43						0	0	SLST	5						Y
	20 32	MCL	10YR54						0	0	SLST	20		M				Y
4	0 18	HZCL	10YR54						0	0		0						Y
	18 35	HCL	10YR54	10YR46	C			S	0	0	SLST	20		M			N	Y
	35-55	C	10YR43	10YR46	M			Y	0	0	SLST	20		M			N	Y
	55-75	C	10YR41	10YR46	M			Y	0	0	SLST	20		P			Y	Y
5	0 28	HCL	10YR43						2	0	SLST	5						Y
	28 50	C	10YR54	10YR54	C			Y	0	0	SLST	10		M			N	Y
6A	0 25	C	10YR43						12	5	SLST	15						Y
6B	0 25	C	10YR42						7	1	SLST	10						Y
6C	0 25	C	10YR42						14	5	SLST	20						Y
7	0 30	C	10YR54						7	0	SLST	10						Y
8	0 17	MZCL	10YR42						0	0		0						Y
	17 39	HZCL	10YR52	10YR56	C			Y	0	0		0		M				Y
	39 45	HZCL	10YR43	10YR58	M			Y	0	0	SLST	35		M			N	Y
10	0 32	C	10YR43						2	0	SLST	5						Y
10A	0 32	HCL	10YR43						12	2	SLST	15						Y
10B	0 32	HCL	10YR43						20	5	SLST	25						Y
10C	0 32	HCL	10YR43						7	2	SLST	10						Y
12	0 33	C	25Y52						0	0	SLST	2						N
	33 58	C	25Y53	10YR58	C			Y	0	0	SLST	10		M				Y
13	0 27	HCL	10YR43						1	0	SLST	4						N
	27 38	C	10YR54						0	0	SLST	2		M				N
	38 50	C	10YR63						0	0	SLST	2		M				N
	50 70	C	10YR61	10YR61	M			Y	0	0	SLST	2		P			Y	N
14	0 27	HCL	10YR43						0	0	SLST	20						Y
	27 58	C	10YR52	10YR46	C			Y	0	0	SLST	20		M			N	Y
15	0 29	HCL	10YR54						16	6	SLST	26						Y
17	0 30	C	10YR42						0	0	SLST	2						N
	30 55	C	10YR54						0	0	SLST	1		M				N
	55 80	C	10YR53	10YR56	C			Y	0	0		0		P			Y	N

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC
18	0 27	HCL	25Y53						0	0	SLST	2						N
	27 42	C	25Y54						0	0	SLST	2		M				N
	42 80	C	25Y61	10YR68	C			Y	0	0	SLST	2		P			Y	N
19	0 34	C	25Y53						0	0	HR	1						N
	34 60	C	25Y61	10YR58	M			Y	0	0	SLST	1		P			Y	N
21	0 28	C	10YR53						0	0	HR	2						
	28 52	C	10YR53	000C00	C			Y	0	0		0		M				
23	0 30	C	10YR42	10YR56	C			Y	0	0	SLST	2						N
	30 55	C	25Y 53	10YR56	C			Y	0	0		0		P			Y	N
24	0 32	C	10YR43						0	0	SLST	2						
	32 55	C	10YR44						0	0	SLST	2		M				N
	55 85	C	75YR44						0	0	SLST	2		M				N
	85 120	C	75YR43	75YR5658	M			Y	0	0	SLST	2		P			Y	N
25	0 34	C	10YR42						1	0	SLST	4						
	34 56	C	10YR54						0	0	SLST	2		M				
	56 85	C	10YR73	75YR56	M			Y	0	0	SLST	2		P			Y	
26	0 28	C	10YR42						0	0	HR	2						
	28 60	C	10YR53	000C00	C			Y	0	0		0		P				
28	0 25	C	10YR43						0	0	SLST	15						Y
	25 30	C	10YR54						0	0	SLST	15		M				Y
28A	0 25	HCL	10YR43						20	12	SLST	25						Y
28B	0 25	HCL	10YR43						25	18	SLST	30						Y
29	0 30	C	10YR43						1	0	HR	3						Y
	30 42	C	10YR54						0	0	HR	5		M				Y
	42 62	C	10YR53	000C00	C			Y	0	0	HR	1		P				Y

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL	PED GLEY	STONES 2	STONES 6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC
1P	0 27	C	25Y 53					N	2	0	SLST	4						C
	27 57	C	25Y 54						0	0	SLST	5	MCSAB	FR	M			
	57 83	C	25Y 61	10YR66	M		25Y 51	Y	0	0	SLST	3	MCAB	FM	P	Y	Y	

SAMPLE NO	GRID REF	USE	ASPECT		WETNESS GRDNT	GLEY	SPL	CLASS	GRADE	WHEAT AP	WHEAT MB	POTS AP	POTS MB	M REL DRT	EROSN FLOOD	FROST EXP	CHEM DIST	ALC LIMIT		COMMENTS
1	SU	PGR						1	1	50	56	50	-47		Y			MR	3B	microrelief
3	SU	PGR						1	1	51	55	51	46					DR	3B	impqdr mrelief
4	SU	PGR				35	55	3	3A	93	13	101	4					WE	3A	if spl 35cm th
5	SU	STU				28		1	2	81	25	81	16					DR	3B	IMP 50CM DR3A
6A	SU	STU								38	68	38	59					TS	3A	
6B	SU	STU								39	67	39	58					TS	2	
6C	SU	STU								36	70	36	61					TS	3A	
7	SU	STU								49	57	49	48					DR	4	IMP 30CM
8	SU	PGR	N	1		17		2	2	77	29	77	20					DR	3B	IMP 45CM DR3A
10	SU	STU						1	2	52	54	52	45					DR	3A	impqdrwe
10A	SU	STU								48	58	48	49					TS	3A	
10B	SU	STU								44	62	44	53					TS	3B	
10C	SU	STU								53	53	53	44					TS	2	
12	SU	STU				34	34	4	3B	85	21	91	6					WE	3B	spl 34cm
13	SU	STU	N	1		50	50	3	3B	97	9	109	12					WE	3B	spl 50cm
14	SU	STU	N	1		27		2	2	78	28	83	14					DR	3B	imp
15	SU	STU						1	1	46	60	46	51					TS	3B	imp 29 slst
17	SU	STU				55	55	2	3B	103	3	109	12					WE	3B	SPL 55CM
18	SU	STU	W	1		42	42	3	3B	102	4	107	10					WE	3B	
19	SU	STU	W	1		33		2	3B	71	35	83	14					WE	3B	ts not calc
21	SU	STU				28		4	3B	84	22	85	12					WE	3B	noncalc
23	SU	STU				30	30	4	3B	80	26	83	14					WE	3B	SPL 30CM
24	SU	STU	SW	2		85	85	1	3A	137	31	117	20					WE	3A	
25	SU	STU	SW	1		56	56	2	3B	109	3	112	15					WE	3B	noncalc
26	SU	STU				28		4	3B	82	24	88	9					WE	3B	noncalc
28	SU	STU								43	63	43	54					DR	4	IMP 30CM
28A	SU	STU						1	1		0		0					TS	3B	tssieve
28B	SU	STU								35	71	35	62					TS	3B	
29	SU	STU				42		3	3A	86	20	94	3					WE	3A	calc

SAMPLE NO	GRID REF	ASPECT USE	GRDNT	GLEY	SPL	WETNESS CLASS	WETNESS GRADE	WHEAT AP	WHEAT MB	POTS AP	POTS MB	M REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC COMMENTS
1P	SU STU		57	57	2	3B	103	3	107	10		Y			WE	3B	noncalc