A1

M40 Motorway Service Areas
Site 4 Lewknor B
Agricultural Land Classification
ALC Map and Report
October 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

M40 MOTORWAY SERVICE AREAS
SOUTH OXFORDSHIRE DISTRICT COUNCIL, LEWKNOR B
AGRICULTURAL LAND CLASSIFICATION

Summary

1 1 ADAS was commissioned by MAFF s Land Use Planning Unit to provide information on land quality on land near Lewknor Site B This work was in connection with proposed M40 motorway service areas

1 2 Approximately 13 4 hectares of land relating to this area was surveyed in September 1994 The survey was undertaken at a detailed level of approximately one boring per hectare A total of 13 borings and 1 soil inspection pit* were assessed in accordance with MAFF s revised guidelines and criteria for grading the quality of agricultural land (MAFF 1988) These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on its use for agriculture Laboratory measured stone contents supplemented the field assessed data

1 3 The work was carried out by members of the Resource Planning Team in the Huntingdon Statutory Group of ADAS

1 4 At the time of survey the agricultural land use was recently ploughed after oil seed rape The area of Urban includes the M40 slip road and associated land

1 5 The distribution of the grades and subgrades is shown on the attached ALC map and the areas are given in the table below The map has been drawn at a scale of 1 10 000 It is accurate at this scale but any enlargement would be misleading This map supersedes any previous survey information for this site

Table 1 Distribution of Grades and Subgrades

Grade	Area (ha)	% of Site	% of Agricultural Area
3b	12 4	92 5	100
Urban	1 0	7 5	
Total	**13 4 ha**	**100%**	**100 % (12 4 ha)**

---

* Additional pit information from adjacent sites was also used in the assessment

1 6 A general description of the grades subgrades and land use categories is provided in Appendix 1 The main classes are described in terms of the type of limitation that can occur the typical cropping range and the expected level and consistency of yield

1 7 The land quality on the site has been classified as grade 3b (moderate quality land) as a result of significant droughtiness imperfections

2 0 **Climate**

2 1 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

2 2 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall as a measure of overall wetness and accumulated temperature as a measure of the relative warmth of a locality The combination of rainfall and temperature at this site mean an overall climatic grade of 1

Table 2 Climatic Interpolation

Grid Reference	SU725979
Altitude (m AOD)	130
Accumulated Temperature (days Jan June)	1364
Average Annual Rainfall (mm)	720
Field Capacity Days	156
Moisture Deficit wheat (mm)	99
Moisture Deficit potatoes (mm)	88
Overall Climatic Grade	1

3 0 **Relief**

3 1 From a height of 145 m AOD on the south eastern boundary the land slopes gently northwards to meet the M40 slip road at a height of 130 m AOD The site is bounded on the north eastern side by the A40 road Neither gradient nor relief impose a limitation to ALC grade

4 0 **Geology and Soils**

4 1 The published geology map for the site area (BGS Sheet 254 1980 Henley on Thames 1 50 000) shows the site to be underlain by Lower Chalk

4 2 The published soils information for the area (SSEW 1983 Sheet 6 1 250 000) shows the site to comprise the Coombe 2 Association described as well drained calcareous fine silty soils over chalk or chalk rubble Shallow soils in places especially on brows and steeper slopes (SSEW 1983) A narrow band of Upton 1 Association may outcrop to the south at the higher elevations This association is described as shallow well drained calcareous silty soils over

chalk Mainly on moderately steep sometimes very steep land Deeper fine silty calcareous soils in coombes and dry valleys (SSEW 1983)

5 0 Agricultural Land Classification

5 1 The ALC classification of the site is shown on the attached ALC map

5 2 The location of the soil observation points is shown on the attached sample point map

Subgrade 3b

5 3 The whole of the agricultural area has been mapped as subgrade 3b Soils typically comprise very slightly or slightly stony calcareous heavy clay loam topsoils to a depth of 25 30 cm Depth to weathered chalk depends upon the presence/absence of funnels of upper subsoil above the chalk consequently overall chalk is encountered from 25 35 cms depth Where upper subsoil occurs it typically comprises chalk in a heavy clay loam matrix with the quantity of chalk stones approximating to 30% Below this the weathered chalk occurs and is rootable to 50 55 cm However below this the chalk becomes impenetrable to roots Availability of water and nutrients is considerably reduced by the high stone content and impenetrability of the chalk to plant roots Consequently a significant droughtiness limitation restricts the land to subgrade 3b

Urban

5 4 Urban areas consist of the M40 slip road and associated land

ADAS Reference 3303/208/94
MAFF Reference EL33/875

Resource Planning Team
Huntingdon Statutory Group
ADAS Cambridge

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES 1980 Sheet 254 Henley on Thames 1 50 000 scale

MAFF 1971 Agricultural Land Classification map sheet 159 Provisional 1 63 360 scale

METEOROLOGICAL OFFICE 1989 Data extracted from the published agroclimatic dataset

SOIL SURVEY OF ENGLAND AND WALES 1983 Sheet 6 South East England 1 250 000 scale

Appendix 1

DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur typical cropping range and the expected level of consistency of yield In practice the grades are defined by reference to physical characteristics and the *grading guidance and cut offs for limitation factors in Section 3* enable land to be ranked in accordance with these general descriptions The most productive and flexible land falls in Grades 1 and 2 and Subgrade 3a and collectively comprises about one third of the agricultural land in England and Wales About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4 Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where farmland predominates The remainder is very poor quality land in Grade 5 which most occurs in the uplands

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 include 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 and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable crops The level of yield is generally high but may be lower or more variable than Grade 1

Grade 3 good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops timing and type of cultivation harvesting or the level of yield Where 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 levels of yields It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yield of which are variable In most 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 very severe limitations which restrict use to permanent pasture or rough grazing except for occasional pioneer forage crops

Descriptions of other land categories used on ALC maps

Urban

Built up or hard uses with relatively little potential for a return to agriculture including housing industry commerce education transport religious buildings cemeteries Also hard surfaced sports facilities permanent caravan sites and vacant land all types of derelict land including mineral workings which are only likely to be reclaimed using derelict land grants

Non agricultural

Soft uses where most of the land could be returned relatively easily to agriculture including private parkland public open spaces sports fields allotments and soft surfaced areas on airports/airfields Also active mineral workings and refuse tips where restoration conditions to soft after uses may apply

Woodland

Includes commercial and non commercial woodland A distinction may be made as necessary between farm and non farm woodland

Agricultural buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses Temporary structures (e g polythene tunnels erected for lambing) may be ignored

Open water

Includes lakes ponds and rivers as map scale permits

Land not surveyed

Where the land use includes more than one of the above land cover types e g buildings in large grounds and where map scale permits the cover types may be shown separately Otherwise the most extensive cover type will usually be shown

Appendix 2

FIELD ASSESSMENT OF SOIL WETNESS CLASS

Definition of Soil Wetness Classes

Wetness Class	Duration of Waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years[2]
II	The soil profile is wet within 70 cm depth for 31 90 days in most years *or* if there is no slowly permeable layer within 80 cm depth it is wet within 70 cm for more than 90 days but not wet within 40 cm depth for more than 30 days in most years
III	The soil profile is wet within 70 cm depth for 91 180 days in most years *or* if there is no slowly permeable layer within 80 cm depth it is wet within 70 cm for more than 180 days but only wet within 40 cm depth for between 31 and 90 days in most years
IV	The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years *or*, if there is no slowly permeable layer within 80 cm depth it is wet within 40 cm depth for 91 210 days in most years
V	The soil profile is wet within 40 cm depth for 211 335 days in most years
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years

[1] The number of days specified is not necessarily a continuous period

[2] In most years is defined as more than 10 out of 20 years

Appendix 3

SOIL BORING AND SOIL PIT DESCRIPTIONS

Contents

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
1	0 30	hcl	10YR41 00						1	0	CH	3						Y	
	30 35	hcl	25 Y72 00						0	0	CH	30		M	Y			Y	
	35 55	ch	25 Y71 00						0	0		0		P	Y			Y	
1P	0 25	hcl	10YR41 00						0	0	CH	7						Y	
	25 35	h l	10YR72 00						0	0	CH	27	MDMDAB FR	M				Y	
	35 55	hcl	25 Y72 00						0	0	CH	45		P				Y	ROOTING TO 55
3	0 25	c	10YR41 00						2	0	CH	10						Y	
	25 45	ch	25 Y71 00						0	0		0		P	Y			Y	
4	0 25	hcl	10YR41 00						1	0	CH	10						Y	
	25 30	hcl	10YR72 00						0	0	CH	30		M	Y			Y	
	30 50	ch	25 Y71 00						0	0		0		P	Y			Y	
6	0 25	hcl	10YR41 00						2	0	CH	10						Y	
	25 45	h	25 Y71 00						0	0		0		P	Y			Y	
7	0 30	hcl	10YR41 00						1	0	CH	5						Y	
	30 50	ch	25 Y71 00						0	0		0		P	Y			Y	
8	0 25	hcl	10YR41 00						0	0	CH	5						Y	
	25 35	hcl	25 Y73 00						0	0	CH	30		M	Y			Y	
	35 55	ch	25 Y71 00						0	0		0		P	Y			Y	
9	0 25	hcl	10YR41 00						1	0	CH	10						Y	
	25 45	ch	25 Y71 00						0	0		0		P	Y			Y	
10	0 25	hcl	10YR41 00						1	0	CH	5						Y	
	25 35	hcl	25 Y72 00						0	0	CH	30		M	Y			Y	
	35 55	ch	25 Y71 00						0	0		0		P	Y			Y	
11	0 30	hcl	10YR41 00						1	0	CH	10						Y	
	30 50	hcl	25 Y72 00						0	0	CH	30		M	Y			Y	
	50 60	ch	25 Y71 00						0	0		0		P	Y			Y	
12	0 25	hcl	10YR41 00						1	0	CH	15						Y	
	25 45	ch	25 Y71 00						0	0		0		P	Y			Y	
13	0 30	h l	10YR41 00						2	0	CH	10						Y	
	30 50	ch	25 Y71 00						0	0		0		P	Y			Y	
14	0 25	hcl	10YR41 00						3	0	CH	15						Y	
	25 45	ch	25 Y71 00						0	0		0		P	Y			Y	
15	0 25	hcl	10YR41 00						1	0	CH	15						Y	
	25 30	hcl	25 Y72 00						0	0	CH	30		M	Y			Y	
	30 50	ch	25 Y71 00						0	0		0		P	Y			Y	

SAMPLE NO	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	WETNESS CLASS	WHEAT GRADE	POTS AP	POTS MB	M REL AP	M REL MB	DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SU72509800	PLO	N	01			1	2	79	20	80	8	3A				DR	3A	ALMOST 3B
1P	SU72609790	PLO	N	01			1	2	78	21	80	8	3B				DR	3B	PIT @ AB4
3	SU72509790	PLO	N	01			1	3A	61	38	61	27	3B				DR	3B	
4	SU72609790	PLO	N	01			1	2	70	29	70	18	3B				DR	3B	
6	SU72409780	PLO	N	01			1	2	63	36	63	25	3B				DR	3B	
7	SU72509780	PLO	N	01			1	2	73	26	73	15	3B				DR	3B	
8	SU72609780	PLO	N	01			1	2	77	22	78	10	3B				DR	3B	
9	SU72709780	PLO	N	02			1	2	63	36	63	25	3B				DR	3B	
10	SU72309770	PLO	N	01			1	2	77	22	78	10	3B				DR	3B	
11	SU72409770	PLO	N	01			1	2	87	12	90	2	3A				DR	3A	
12	SU72509770	PLO	N	02			1	2	62	37	62	26	3B				DR	3B	
13	SU72609770	PLO	N	02			1	2	72	27	72	16	3B				DR	3B	
14	SU72309760	PLO	N	02			1	2	62	37	62	26	3B				DR	3B	
15	SU72409760	PLO	N	03			1	2	69	30	69	19	3B				DR	3B	

SOIL PIT DESCRIPTION

S te Name M40 MSA LEWKNOR B OXON P t N mber 1P

Gr d Reference SU72609790 A age A n l Ra fall 720 mm
Acc m lated Temper t e 1364 deg ee d ys
F eld Capac ty L el 156 d ys
La d Use Plo ghed
Slope a d Aspect 01 deg ees N

HORIZON	TEXTURE	COLOUR	STONES 2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0 25	HCL	10YR41 00	0	7	CH					Y
25 35	HCL	10YR72 00	0	27	CH		MDMDAB	FR	M	Y
35 55	HCL	25 Y72 00	0	45	CH				P	Y

Wetness Grade 2 Wet ss Cl ss I
Gley g cm
SPL No SPL

D ght G ade 3B APW 78 mm MBW 21 mm
APP 80 mm MBP 8 mm

FINAL ALC GRADE 3B
MAIN LIMITATION D o ght n s

Appendix 3 (Cont)

SOIL PROFILE DESCRIPTIONS EXPLANATORY NOTE

Soil profile and pit information obtained during ALC surveys is held on a database This has commonly used notations and abbreviations as set out below

BORING HEADERS

1 GRID REF National grid square followed by 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
FDC fodder crops
FRT soft and top fruit
HOR/HRT horticultural crops

PAS/PGR permanent pasture
RGR rough grazing
LEY ley grassland
CFW coniferous woodland
DCW deciduous woodland
SCR scrub
HTH heathland
BOG bog or marsh
FLW fallow
PLO ploughed
SAS set aside
OTH other
LIN linseed

3 GRDNT Gradient as measured by optical reading clinometer

4 GLEY/SPL Depth in centimetres (cm) to gleyed and/or slowly permeable horizons

5 AP (WHEAT/POTS) Crop adjusted available water capacity The amount of soil water (in millimetres) held in the soil profile that is available to a growing crop (wheat and potatoes are used as reference crops)

6 MB (WHEAT/POTS) The moisture balance for wheat and potatoes obtained by subtracting the soil moisture deficit from the crop adjusted available water capacity

7 DRT Grade according to soil droughtiness assessed against soil moisture balances

8

M REL	Micro relief	)
FLOOD	Flood risk	) If any of these factors are
EROSN	Soil erosion	) considered significant in terms of
EXP	Exposure	) the assessment of agricultural land
FROST	Frost prone	) quality a y will be entered in the
DIST	Disturbed land	) relevant column
CHEM	Chemical limitation	)

9 LIMIT Principal limitation to agricultural land quality
The following abbreviations are used

OC overall climate	CH chemical limitations
AE aspect	WE wetness
EX exposure	WK workability
FR frost	DR drought
GR gradient	ER erosion
MR micro relief	WD combined soil wetness/soil droughtiness
TX soil texture	ST topsoil stoniness
DP soil depth	

PROFILES AND PITS

1 TEXTURE Soil texture classes are denoted by the following abbreviations

S	sand
LS	loamy sand
SL	sandy loam
SZL	sandy silt loam
ZL	silt loam
MZCL	medium silty clay loam
MCL	medium clay loam
SCL	sandy clay loam
HZCL	heavy silty clay loam
HCL	heavy clay loam
SC	sandy clay
ZC	silty clay
C	clay

For the sand loamy sand sandy loam and sandy silt loam classes the predominant size of sand fraction may be indicated by the use of prefixes

F fine (more than ⅔ of the sand less than 0 2 mm)
C coarse (more than ⅓ of sand greater than 0 6 mm)
M medium (less than ⅔ fine sand and less than ⅓ coarse sand)

The sub divisions of clay loam and silty clay loam classes according to clay content are indicated as follows

M medium (less than 27% clay)
H heavy (27 35% clay)

Other possible texture classes include

OL organic loam
P peat
SP sandy peat
LP loamy peat
PL peaty loam
PS peaty sand
MZ marine light silts

2 MOTTLE COL Mottle colour

3 MOTTLE ABUN Mottle abundance

F few less than 2% of matrix or surface described
C common 2 20% of the matrix
M many 20 40% of the matrix
VM very many 40% + of the matrix

4 MOTTLE CONT Mottle continuity

F faint indistinct mottles evident only on close examination
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

6 STONE LITH Stone lithology One of the following is used

HR all hard rocks or stones
MSST soft medium or coarse grained sandstone
SI soft weathered igneous or metamorphic
SLST soft oolitic or dolomitic limestone
FSST soft fine grained sandstone
ZR soft argillaceous or silty rocks
CH chalk
GH gravel with non porous (hard) stones
GS gravel with porous (soft) stones

Stone contents (>2 cm >6 cm and total) are given in percentages (by volume)

7 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 well developed
ped size	F fine
	M medium
	C coarse
	VC very coarse
ped shape	S single grain
	M massive
	GR granular
	SB/SAB sub angular blocky
	AB angular blocky
	PR prismatic
	PL platy

8 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

9 SUBS STR Subsoil structural condition recorded for the purpose of calculating profile droughtiness

G good
M moderate
P poor

10 POR Soil porosity If a soil horizon has less than 0 5% biopores >0 5 mm a y will appear in this column

11 IMP If the profile in impenetrable a y will appear in this column at the appropriate horizon

12 SPL slowly permeable layer If the soil horizon is slowly permeable a y will appear in this column

13 CALC If the soil horizon is calcareous a y will appear in this column

14 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