

**A1
East Hampshire Local Plan
Site 640: Land at Basingstoke
Road, Alton
Agricultural Land Classification,
ALC Map and Report
March 1995**

AGRICULTURAL LAND CLASSIFICATION REPORT

EAST HAMPSHIRE LOCAL PLAN

SITE 640: LAND AT BASINGSTOKE ROAD, ALTON

1. Summary

- 1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality for a number of sites in the East Hampshire district of Hampshire. The work forms part of MAFF's statutory input to the East Hampshire Local Plan.
- 1.2 Site 640 comprises 4.2 hectares of land to the north of Basingstoke Road and to the west of the A32 at Alton, east Hampshire. An Agricultural Land Classification (ALC) survey was carried out during March 1995. The survey was undertaken at a detailed level of approximately two borings per hectare. A total of 7 borings and one soil inspection pit were described 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 a long term limitation on its use for agriculture.
- 1.3 The work was carried out by members of the Resource Planning Team in the Guildford Statutory Group of ADAS.
- 1.4 At the time of the survey the land was under permanent pasture.
- 1.5 The distribution of grades and subgrades is shown on the attached ALC map and the areas and extent 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.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% of Agricultural Land
3b	4.1	97.6
4	<u>0.1</u>	<u>2.4</u>
Total area of site	4.2	100.0

- 1.6 Appendix I gives a general description of the grades, subgrades and land use categories identified in the survey. 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 majority of agricultural land surveyed has been classified as Subgrade 3b, moderate quality. This land is subject to significant soil droughtiness and wetness limitations, and in parts also by topsoil stone contents. Very stony and extremely stony subsoils at shallow depths act to restrict the amount of soil profile water

available for uptake by crop roots. This will reduce the level and consistency of crop yields. In addition, the high percentage of large flints within the topsoil acts to restrict harvesting, cultivations, and crop growth and will increase implement and tyre wear. Given the degree of waterlogging of the profiles at the time of survey, this land also experiences a significant wetness limitation. Consequently this land is also subject to restricted flexibility of cropping, stocking and cultivations.

- 1.8 Land classified as Grade 4, poor quality, is restricted by severe slope limitations. Gradients within the range of 11-18° act to restrict the range of agricultural machinery that may be safely and efficiently used.

2. 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.
- 2.3 A detailed assessment of the prevailing climate was made by interpolation from a 5km gridpoint dataset (Met. Office, 1989). The details are given in the table below and these show that there is no overall climatic limitation affecting the site. However, climatic factors do interact with soil properties to influence soil wetness and droughtiness limitations. The crop adjusted soil moisture deficits are relatively low and the field capacity days are relatively high (in a regional context) due to the high altitude of this site. These climatic factors respectively decrease the likelihood of soil droughtiness limitations and increase that of soil wetness restrictions.

Table 2 : Climatic Interpolation

Grid Reference	SU 707 393
Altitude (m)	105
Accumulated Temperature (degree days, Jan-June)	1418
Average Annual Rainfall (mm)	861
Field Capacity (days)	189
Moisture Deficit, Wheat (mm)	95
Moisture Deficit, Potatoes (mm)	84
Overall Climatic Grade	1

- 2.4 No local climatic factors such as exposure or frost risk are believed to affect the site.

3. Relief

- 3.1 To the south of the drain/River Wey the land is flat, occupying a narrow valley bottom at approximately 105 m AOD. In the northern field the land either rises gently through slopes of 2° or remains flat. The highest point of the site occurs in the north-west corner where the land lies at approximately 110 m AOD. Directly north of the spring, slopes within the range of 11-18° were measured. Such gradients act to impose severe restrictions to agricultural use, and thus such land can be classified as no higher than Grade 4. All gradients were measured using an optical reading clinometer.

4. Geology and Soil

- 4.1 The relevant geological sheet (BGS, 1975) shows most of the site to be underlain by Lower Chalk. The slightly higher land in the north-west corner of the site is shown to be underlain by Upper Chalk.
- 4.2 The published Soil Survey map (SSEW, 1983) maps soils of the Coombe 1 Association across the entire site. These soils are described as 'well drained calcareous fine silty soils, deep in valley bottoms, shallow to chalk on valley sides in places' (SSEW, 1983).
- 4.3 Detailed field examination found soils to be atypical of the Coombe 1 Association, probably because of the groundwater influence of the River Wey and the valley bottom location. Soils were found to comprise gravelly and gravel deposits which are affected by groundwater.

5. Agricultural Land Classification

- 5.1 Table 1 provides the details of the area measurements for each grade and the distribution of each grade is shown on the attached ALC map.
- 5.2 The location of the soil observation points are shown on the attached sample point map.

Subgrade 3b

- 5.3 The majority of agricultural land surveyed has been classified as Subgrade 3b, moderate quality. This land is subject to significant soil droughtiness and wetness limitations and, across part of the site, by topsoil stone limitations. Topsoils and upper subsoils typically comprise non-calcareous medium clay loams. Topsoils tend to be relatively shallow and are slightly stony, containing 5-10% total flints by volume. Due to the gravelly nature of the subsoils all of the auger borings proved impenetrable to a soil auger between 20 and 40 cm depth. Consequently, a soil inspection pit (Pit 1) was dug to assess subsoil conditions. The upper subsoil was found to be very stony, containing approximately 45% flints larger than 2 cm and 60% total flints by volume. Such stoniness meant that the size and shape of soil peds and their degree of development could not be assessed. However, given the very high percentage of flints a poor subsoil structure has been assumed. At

approximately 35 cm depth, this profile passed into gravel deposits. Due to high groundwater levels at the time of survey it was only possible to dig the pit to a depth of 55 cm depth. Roots should be able to extend further in search of available water but the exact depth of penetration below 55 cm is unknown. Assuming deep penetration, these soils can be graded no higher than Subgrade 3b. If extra evidence on rooting depth were forthcoming and showed a restriction in the depth of rooting, areas of poorer quality land may be mapped. It is unclear, however, as to what role the water table might play throughout the growing season in providing an additional source of moisture to roots that cannot penetrate to depth. As a result, the land has been placed in Subgrade 3b. This will result in a significant soil droughtiness limitation which will reduce the level and consistency of crop yields.

- 5.4 In addition, soil profiles which have relatively shallow topsoils, typically 16-20 cm depth, can be downgraded because of a topsoil stone content limitation. This arises from the high percentage of flints larger than 2 cm within the top 25 cm of the soil. Although the topsoils contain no large flints the upper subsoils contain approximately 45% of flints larger than 2 cm. If ploughing were undertaken, the re-distribution of flints larger than 2 cm would result in an overall large flint content of approximately 18% by volume within the top 25 cm of soil. Such topsoil stones would act to significantly impede cultivation, harvesting and crop growth plus increase implement and tyre wear.
- 5.5 This land can also be classified as no better than Subgrade 3b because of a significant soil wetness limitation. At the time of survey (1 March 1995) groundwater tables were observed within the top 40 cm of soil both within auger boring observations and within Pit 1. In addition, parts of the eastern end and centre of the site were flooded. Based upon these findings it was felt that Wetness Class IV is the most appropriate soil wetness assessment (see Appendix II). The interaction between these soil conditions and the prevailing local climate (which is relatively wet in a regional context) means that this land is subject to significant restrictions on cultivations, trafficking by machinery or grazing by livestock.
- 5.6 A boring of better quality land (Subgrade 3a) was found in the north-west corner of the site where the land is gently sloping and of slightly higher altitude. This area, which is underlain by Upper Chalk, does not constitute a large enough unit to be mapped separately. However, it is likely that the land to the north of the present site (which is also underlain by Upper Chalk) would again be of better quality.

Grade 4

- 5.7 Land classified as poor agricultural quality is associated with severe slope limitations. Gradients within the range of 11-18° were measured and these will act to severely restrict or preclude mechanised farm operations from safe and efficient use. Such land is best suited to grazing.

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Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1975), Sheet No. 300, Alresford, 1:50,000 Series (drift edition).

MAFF (1988), Agricultural Land Classification of England and Wales : Revised guidelines and criteria for grading the quality of agricultural land.

Meteorological Office (1989), Climatological Data for Agricultural Land Classification.

Soil Survey of England and Wales (1983), Sheet 6, Soils of South East England, 1:250,000 and accompanying legend.

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.

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. 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 (eg. polythene tunnels erected for lambing) may be ignored.

Open Water

Includes lakes, ponds and rivers as map scale permits.

Land Not Surveyed

Agricultural land which has not been surveyed.

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

APPENDIX II

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

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 only wet within 40 cm depth for 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 present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer present 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.

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics, site and climatic factors. Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field. The method adopted here is common to ADAS and the SSLRC.

¹The 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 III
SOIL PIT AND SOIL BORING DESCRIPTIONS

Contents :

Soil Abbreviations - Explanatory Note

Soil Pit Descriptions

Database Printout - Boring Level Information

Database Printout - Horizon Level Information

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	DCW : Deciduous Wood
HTH : Heathland	BOG : Bog or Marsh	FLW : Fallow
PLO : Ploughed	SAS : Set aside	OTH : Other
HRT : Horticultural Crops		
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	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

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	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:

degree of development **WK** : weakly developed **MD** : moderately developed
 ST : strongly developed

ped size **F** : fine **M** : medium
 C : coarse **VC** : very 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

SOIL PIT DESCRIPTION

Site Name : EAST HANTS LP SITE 640 Pit Number : 1P

Grid Reference: SU70703930 Average Annual Rainfall : 861 mm
 Accumulated Temperature : 1418 degree days
 Field Capacity Level : 189 days
 Land Use : Permanent Grass
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 16	MCL	10YR41 00	0	5	HR					
16- 35	MCL	10YR41 00	45	60	HR				P	
35-120	GH	10YR42 00	0	0					P	

Wetness Grade : 3B Wetness Class : IV
 Gleying : cm
 SPL : cm

Drought Grade : 3B APW : 48 mm MBW : -47 mm
 APP : 45 mm MBP : -39 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Droughtiness

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	SU70803940	PGR		23	4	3B	58	-37	58	-26	3B				DR 3B Imp40 Re 1P
1P	SU70703930	PGR			4	3B	48	-47	45	-39	3B				DR 3B Water table 30
2	SU70903940	PGR S	02		4	3B	49	-46	49	-35	3B				DR 3B Imp30 Re 1P
3	SU70603930	PGR SE	02		2	3A	79	-16	79	-5	3A				WD 3A S1 gley25; I50
4	SU70703930	PGR			4	3B	41	-54	41	-43	4				DR 3B Imp25 Re 1P
5	SU70733927	PGR			4	3B	34	-61	34	-50	4				WE 3B Imp20 Re 1P
6	SU70923934	PGR			4	3B	34	-61	34	-50	4				WE 3B Imp20 flooded
7	SU70783935	PGR			4	3B	61	-34	61	-23	3B				WE 3B I40 wet Re 1P

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES----			STRUCT/ CONSIST	SUBS				
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR	POR	IMP	SPL
1	0-23	mc1	10YR43 00						0	0	HR	10					
	23-40	hc1	10YR53 52	10YR56	00	C		Y	0	0	HR	25		M			
1P	0-16	mc1	10YR41 00						0	0	HR	5					
	16-35	mc1	10YR41 00						45	0	HR	60		P			
	35-120	gh	10YR42 00						0	0		0		P			
2	0-30	mc1	10YR43 00						0	0	HR	10					
3	0-25	mc1	10YR43 00						0	0	HR	10					
	25-50	hc1	10YR54 00	10YR56	00	C		S	0	0	CH	10		M			Y
4	0-25	mc1	10YR42 00						0	0	HR	10					
5	0-20	mc1	10YR32 00						0	0	HR	5					
6	0-20	mc1	10YR32 00						0	0	HR	5					
7	0-25	mc1	10YR32 00						0	0	HR	5					
	25-40	mc1	10YR42 00						0	0	HR	25		M			