A1
Proposed A2 Service Station
Barham Down, Kingston, Kent
ALC Map and Report
June, 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

PROPOSED A2 SERVICE STATION, BARHAM DOWN, KINGSTON, KENT

Summary

1.1 ADAS was commisioned by MAFF's Land Use Planning Unit to provide information on land quality on approximately 23 hectares of land, north and south of the A2 at Barham Down, Kingston in Kent. This work was in connection with a proposed service station ad hoc planning application.

1.2 The survey was undertaken in June, 1994, at a detailed level of approximately one boring per hectare. A total of 18 borings and 1 soil 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.

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 survey, the agricultural land use on the northern site was grassland with barley in the southern block.

1.5 All of the site (22.6 hectares) has been classified as Subgrade 3b (moderate quality agricultural land) as a result of a significant soil droughtiness limitation. Shallow stony soils overlie hard chalk deposits with limited potential for rooting. The land quality information is shown on the attached map 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.

1.6 A general description of the grades, subgrades and land use categories is provided in Appendix I. 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.

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. The combination

of rainfall and temperature at this site mean that there is no overall climatic limitation.

Table 2 :Climatic Interpolations

Grid Reference	TR200519	TR201517	TR204520
Altitude (m, AOD)	72	55	88
Accumulated Temperature (°days, Jan-June)	1416	1436	1398
Average Annual Rainfall (mm)	770	765	775
Field Capacity Days	161	160	161
Moisture deficit, wheat (mm)	111	113	109
Moisture deficit, potatoes (mm)	106	108	103
Overall Climatic Grade	1	1	1

3. Relief

3.1 The site occupies gentle south-west facing upper crest slopes at an altitude of 45-90 metres. In the southern block, the slopes reach 6.5°; nowhere on the site do gradient or microrelief affect the land quality.

4. Geology and Soils

4.1 The published geology map for the site area, (BGS, 1978) shows the site to be underlain by Upper Chalk.

4.2 The published soils information for the area (SSEW, 1983) shows the site to comprise the Andover 1 Association, described as shallow, well-drained, calcareous silty soils on slopes and crests.

5. 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 All of the site has been placed in this grade as a direct result of a soil droughtiness limitation. There is little variation across the site with the typical soils being very shallow over the Upper Chalk. The chalk itself is hard and compact and could not be penetrated any distance by augering.

5.4 Pit 1 is representative of the soils that occur in both of the agricultural blocks. The topsoil resource is approximately 25-30 cm deep, containing 25% chalk stone (12% > 2cm) and is medium silty clay loam in texture. The topsoils generally sit directly on the chalk with a very distinct boundary. The chalk breaks into blocky stones with clear root mats around the edges with some soil staining and weathering, down to approximately 50 cm. Below this depth there is very little evidence of root penetration and the chalk is very white and less weathered and also more compact.

5.5 Given the observed rooting depth and the more compact nature of the chalk below, the calculation of available water has been stoppped at 50 cm. The moisture balances that result place these soils well into Subgrade 3b. The restriction on the available water in the profiles reduces actual yields as well as the consistency of yields.on this land.

Sources of Reference

British Geological Survey (1978), Sheet Number 289, Canterbury, 1:50,000.

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 Number 6, Soils of South East England, 1:250,000.

Soil Survey of England and Wales (1984), Soils and their Use in South East England, Bulletin Number 15.

Resource Planning Team
Guildford Statutory Group
ADAS Reading

ADAS Reference : 2004/125/94
MAFF Reference : EL 20/886

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.

[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 III

SOIL PIT AND SOIL BORING DESCRIPTIONS

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	**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. **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	**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		

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ST : Topsoil Stoniness		

8. **STRUCT** : the degree of development, size and shape of soil peds are described using the following notation:

degree of development	**WK** : weakly developed **ST** : strongly developed	**MD** : moderately developed
ped size	**F** : fine **C** : coarse	**M** : medium **VC** : very coarse
ped shape	**S** : single grain **GR** : granular **SAB** : sub-angular blocky **PL** : platy	**M** : massive **AB** : angular blocky **PR** : prismatic

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 appropiate 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 : BARHAM DOWNS SERVICE Pit Number : 1P

Grid Reference: TR20355190
Average Annual Rainfall : 770 mm
Accumulated Temperature : 1416 degree days
Field Capacity Level : 161 days
Land Use : Permanent Grass
Slope and Aspect : 01 degrees SW

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 25	MZCL	10YR42 00	12	25	CH					
25- 50	CH		0	0						

Wetness Grade : 1
Wetness Class : I
Gleying :000 cm
SPL : No SPL

Drought Grade : 3B
APW : 067mm MBW : -42 mm
APP : 067mm MBP : -36 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EXP	EROSN DIST	FROST LIMIT	CHEM	ALC	COMMENTS
1	TR201 522	PGR			000		1	1	055	-54	055	-48	4				DR		3B	IMPQROOT
1P	TR20355190	PGR	SW	01	000		1	1	067	-42	067	-36	3B				DR		3B	PIT60 ROOT 50
2	TR202 522	LEY			000		1	1	091	-18	093	-10	3A				DR		3A	IMPQROOT
3	TR201 521	PGR	SW	02	000		1	1	051	-58	051	-52	4				DR		3B	IMPQROOT
4	TR202 521	PGR	SW	02	000		1	1	055	-54	055	-48	4				DR		3B	IMPQROOT
5	TR203 521	PGR			000		1	1	064	-45	064	-39	3B				DR		3B	IMPQROOT
7	TR200 520	BAR	SW	03	000		1	1	053	-56	053	-50	4				DR		3B	SEE PIT1
9	TR202 520	PGR	SW	02	000		1	1	063	-46	063	-40	3B				DR		3B	IMPQROOT
10	TR203 520	PGR	SW	02	000		1	1	056	-53	056	-47	4				DR		3B	IMPQROOT
11	TR204 520	LEY	SW	01	000		1	1	064	-45	064	-39	3B				DR		3B	IMPQROOT
12	TR205 520	LEY			000		1	1	074	-35	074	-29	3B				DR		3B	IMPQROOT
13	TR19955190	BAR	SW	06	000		1	1	055	-54	055	-48	4				DR		3B	SEE PIT1
16	TR203 519	PGR	SW	03	000		1	1	053	-56	053	-50	4				DR		3B	IMPQROOT
17	TR20375185	PGR	SW	02	000		1	1	055	-54	055	-48	4				DR		3B	IMPQROOT
18	TR20455190	PGR	SW	03	000		1	1	055	-54	055	-48	4				DR		3B	IMPQROOT
19	TR19955185	BAR	SW	06	000		1	1	066	-43	066	-37	3B				DR		3A	IMPX3QDR
20	TR20155175	BAR	SW	06	000			1	058	-51	058	-45	4				DR		3B	SEE PIT1
21	TR202 518	BAR	SW	06	000		1	1	053	-56	053	-50	4				DR		3B	SEE PIT1
23	TR20055175	BAR	SW	05	000		1	1	066	-43	066	-37	3B				DR		3B	SEE PIT1

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	0-25	mzcl	10YR42 00						0	0	CH	10						
	25-35	ch							0	0		0						
1P	0-25	mzcl	10YR42 00						12	0	CH	25						
	25-50	ch							0	0		0						
2	0-30	mzcl	10YR43 00						0	0	CH	5						
	30-48	mzcl	10YR54 00						0	0	CH	5		M				
	48-55	ch							0	0		0						
3	0-22	mzcl	10YR42 00						0	0	CH	20						
	22-35	ch							0	0		0						
4	0-25	mzcl	10YR43 00						0	0	CH	10						
	25-35	ch							0	0		0						
5	0-28	mzcl	10YR42 00						0	0	CH	5						
	28-40	ch							0	0		0						
7	0-25	mzcl	10YR42 00						0	0	CH	20						
	25-35	ch							0	0		0						
9	0-28	mzcl	10YR42 00						0	0	CH	10						
	28-40	ch							0	0		0						
10	0-25	mzcl	10YR42 00						0	0	CH	5						
	25-35	ch							0	0		0						
11	0-30	mzcl	10YR42 00						0	0	CH	10						
	30-40	ch							0	0		0						
12	0-30	mzcl	10YR42 00						0	0	CH	10						
	30-38	mzcl	10YR43 00						0	0	CH	10		M				
	38-45	ch							0	0		0						
13	0-25	mzcl	10YR42 00						0	0	CH	10						
	25-35	ch							0	0		0						
16	0-25	mzcl	10YR52 00						0	0	CH	20						
	25-35	ch							0	0		0						
17	0-25	mzcl	10YR42 00						0	0	CH	10						
	25-35	ch							0	0		0						
18	0-25	mzcl	10YR42 00						0	0	CH	10						
	25-35	ch							0	0		0						
19	0-35	mzcl	10YR64 00						0	0	CH	2						

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC
20	0-28	mzcl	10YR42 00						0	0	CH	10						
	28-35	ch							0	0		0						
21	0-25	mzcl	10YR42 00						0	0	CH	20						
	25-35	ch							0	0		0						
23	0-30	mzcl	10YR42 00						0	0	CH	5						
	30-40	ch							0	0		0						