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Arun District Local Plan
Site 2 : Land at Avenals Farm,
Angmering
Agricultural Land Classification
Report
April 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

ARUN DISTRICT LOCAL PLAN

SITE 2 : LAND AT AVENALS FARM, ANGMERING

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 Arun District of West Sussex. The work forms part of MAFF's statutory input to the preparation of the Arun District Local Plan.
- 1.2 Site 2 comprises 15.1 hectares of land located at Avenals Farm, east of Angmering, West Sussex. An Agricultural Land Classification, (ALC), survey was carried out during April 1994. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 9 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 At the time of the survey the land use was mostly cereal stubble whilst the northern-most field was a pony paddock. Land to the west of Avenals Farm was not surveyed due to access difficulties. Land mapped as urban includes residential dwellings and a pub car park, whilst non-agricultural land comprises areas dominated by shrubs or which are in use as a garden.
- 1.4 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 1:5,000. It is accurate at this scale, but any enlargement would be misleading.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% of Site	% of Agricultural Land
2	3.9	25.8	44.8
3b	4.8	31.7	<u>55.2</u>
Non-agricultural land	0.6	4.0	100 (8.7 ha)
Urban	0.6	4.0	
Open Water	0.1	0.7	
Not Surveyed	4.6	30.5	
Farm Buildings	<u>0.5</u>	3.3	
Total area of site	15.1		

- 1.5 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.

- 1.6 Agricultural land on this site has been assigned to Grade 2 and Subgrade 3b. Very good quality, Grade 2 land represents deep, very slightly stony silty clay loam soils affected by a slight soil droughtiness limitation. Moderate quality, Subgrade 3b land is also affected by soil droughtiness but to a greater extent, due to the occurrence of slightly stony soils which pass to gravelly horizons at shallow depth. Profile available water is thereby significantly restricted.

2. Climate

- 2.1 Estimates of climatic variables relevant to the assessment of agricultural land quality were obtained by interpolation from a 5km grid point dataset (Met. Office, 1989) for a representative location in the survey area.

Table 2 : Climatic Interpolation

Grid Reference	TQ075044
Altitude (m)	15
Accumulated Temperature (degree days, Jan-June)	1529
Average Annual Rainfall (mm)	755
Field Capacity (days)	157
Moisture Deficit, Wheat (mm)	120
Moisture Deficit, Potatoes (mm)	116
Overall Climatic Grade	1

- 2.2 Climatic factors are considered first when classifying land since climate can be overriding in the sense that adverse climatic conditions may restrict land quality irrespective of favourable site and soil conditions. The details in the table above show that there is no overall climatic limitation affecting this site. In addition, no local climatic factors such as exposure or frost risk affect the land quality.
- 2.3 However, climatic factors do interact with soil factors to influence soil wetness and droughtiness limitations. At this locality, the climate is relatively warm and dry, in national terms. High soil moisture deficits will increase the likelihood of the land being droughty, whilst partially offsetting soil wetness.

3. Relief

- 3.1 The site lies at an altitude of approximately 5-16 metres, the highest land being found across the southern half of the site. Land falls gently northwards towards the A280, and then more steeply towards the stream at the far north of the site. Locally, very steep slopes border the southerly edge of stream, this land being in non-agricultural use. This has not been mapped as such due to the difficulty of accurately representing such a small area at this scale of mapping.

4. Geology and Soil

- 4.1 British Geological Survey (1972), Sheet 317, Chichester shows the site to be predominantly underlain by valley gravel deposits with Reading Beds and a small band of alluvium shown to the north of Avenals Farm.
- 4.2 Soil Survey of Great Britain (1967) shows the site to comprise a number of soil series, although the majority has been mapped as Hamble series, (deep phase). Small areas of the Titchfield complex, Arundel complex and Charity series have been shown along the northern site boundary in association with the stream. Soils of the Hamble series are described as, 'well drained brown earths developed in silty drift which are stoneless or nearly so,' (SSGB, 1967). The Charity series are described as, 'well drained brown earths developed in flinty silty head,' (SSGB, 1967). Arundel and Titchfield complex soils are less well drained.
- 4.3 Detailed field examination of the soils on the site indicated the presence of two broad soil types. Across the higher, flatter, southern half of the site, deep slightly stony silty clay loam soils were encountered which correlate well with the Hamble series. These correspond with land mapped as Grade 2. The remainder of the site comprises shallow silty clay loam soils overlying very stony, gravelly horizons which may be affected by fluctuating groundwater, similar to the Charity series as described by the Soil Survey.

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.

Grade 2

- 5.3 Very good quality land accounts for just under half of the agricultural land surveyed. It comprises deep, well drained soils which are slightly affected by soil droughtiness. Profiles typically comprise non-calcareous medium silty clay loam topsoils which may contain 1-3% total flints by volume. These overlie similar upper subsoils and pass to heavy silty clay loam from about 40-70 cm depth. Clay or silty clay which is porous and moderately well structured may be encountered at depth, whilst occasional profiles are relatively light comprising medium silty clay loam to depth. There is evidence of slight gleying in the lower subsoil at a number of observations, but overall profiles are well drained, Wetness Class I. However, moisture balance figures indicate that in this dry climatic regime, there is a slight restriction in profile available water. The interaction of soil properties with moisture deficits cause the land to suffer a minor soil droughtiness limitation such that the level and consistency of yields may be adversely affected.

Subgrade 3b

- 5.4 Moderate quality land has been mapped where land slopes gently northwards and soils which are considerably more stony are encountered. The land is thereby affected by moderate soil droughtiness. Profiles comprise medium clay loam or silty clay loam topsoils containing up to 15% total flints v/v, (8% of which may be > 2 cm in diameter), overlying similar upper subsoils. Most observations were impenetrable, (to soil auger), between about 30 and 40 cm depth due to the presence of very stony lower subsoil horizons. A soil inspection pit (Pit 1), showed these to contain between 35 and 55% total flints by volume. Such stone contents act to severely restrict profile available water as well as reducing effective rooting. The result, given a dry climatic regime, is land which is prone to soil droughtiness limitations to the extent that it cannot be graded higher than Subgrade 3b. The flexibility of the land will be adversely affected and plants may suffer drought stress for all or part of the growing season. Crop yields and consistency of yields may be reduced as a consequence.

In the far northern paddock occasional deeper profiles were found within this mapping unit. Here the land may have been disturbed (possibly by tipping) and it is also affected by high groundwater. It was therefore considered appropriate to place such land in Subgrade 3b.

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Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1972) Sheet No. 317, Chichester, 1:63,360.

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 (1967), Sheet TQ00, Worthing, Soil Maps of The West Sussex Coastal Plain. 1:25,000..

Soil Survey of Great Britain (1967), Bulletin 3, Soils of the West Sussex Coastal Plain.

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. **GLEYS** : 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 : ARUN LP, SITE 2

Pit Number : 1P

Grid Reference: TQ07600460 Average Annual Rainfall : 757 mm
 Accumulated Temperature : 1529 degree days
 Field Capacity Level : 157 days
 Land Use :
 Slope and Aspect : 01 degrees N

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 24	MZCL	10YR43 00	0	2		
24- 35	MZCL	10YR44 00	0	4		MDCOAB
35- 45	HZCL	10YR44 54	0	35		
45-120	HZCL	10YR44 54	0	55		

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

Drought Grade : 3B APW : 098mm MBW : -22 mm
 APP : 089mm MBP : -27 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEYS	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN	FROST	CHEM	ALC	COMMENTS	
						CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD						EXP
1	TQ07500470	PGR		0		2	2	152	32	116	0	2					WE	2	DISTURBED?
1A	TQ07450468	PGR	N	01	025	2	2	061	-59	061	-55	4					DR	3B	IMP 35, SEE 1P
1P	TQ07600460	SAS	N	01		1	1	098	-22	089	-27	3B					DR	3B	
2	TQ07600470	SAS	N	02		1	1	050	-70	050	-66	4					DR	3B	IMP 31, SEE 1P
5	TQ07500460	PGR	N	01		1	1	064	-56	064	-52	4					DR	3B	IMP 35, SEE 1P
6	TQ07600460	SAS	N	01		1	1	070	-50	070	-46	3B					DR	3B	IMP 40, SEE 1P
10	TQ07500450	SAS	N	01		1	1	121	1	121	5	3A					DR	2	IMP 90
11	TQ07600450	SAS	N	02	055	1	1	149	29	123	7	2					DR	2	
13	TQ07500440	SAS	N		068	1	1	159	39	124	8	2					DR	2	ALMOST 1
14	TQ07600440	SAS	N	01		1	1	161	41	125	9	2					DR	2	ALMOST 1

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES----			STRUCT/ CONSIST	SUBS			CALC
				COL	ABUN	CONT		GLEYS	>2	>6		LITH	TOT	STR	
1	0-30	mc1	10YR42 00	10YR58 00	C		Y	0	0	CH	2				Y
	30-58	mc1	10YR52 00	75YR46 00	C		Y	0	0	CH	1		M		Y
	58-120	mc1	10YR41 00	10YR56 00	C		Y	0	0	HR	5		M		
1A	0-25	mzc1	10YR42 00					0	0		0				
	25-30	mzc1	10YR52 00	75YR58 00	C		Y	0	0	HR	10		M		
	30-35	mzc1	10YR52 00	75YR58 00	C		Y	0	0	HR	30		M		IMP 35+
1P	0-24	mzc1	10YR43 00					0	0	HR	2				
	24-35	mzc1	10YR44 00					0	0	HR	4	MDCOAB	FM	M	
	35-45	hzc1	10YR44 54					0	0	HR	35			M	
	45-120	hzc1	10YR44 54					0	0	HR	55			P	
2	0-30	mzc1	10YR43 00					8	0	HR	15				
	30-31	mzc1	10YR43 00					0	0	HR	15		M		IMP 31+
5	0-28	mzc1	10YR43 00					0	0	HR	1				
	28-35	mzc1	10YR54 00					0	0	HR	6		M		IMP 35+
6	0-29	mzc1	10YR43 00					0	0	HR	2				
	29-40	mzc1	10YR54 00					0	0	HR	15		M		IMP 40+
10	0-31	mzc1	10YR42 00					2	0	HR	3				
	31-40	mzc1	10YR44 00					0	0		0			M	
	40-50	hzc1	10YR44 00					0	0		0			M	
	50-90	c	10YR44 54					0	0	HR	1			M	IMP 90+
11	0-30	mzc1	10YR43 00					0	0	HR	2				
	30-55	hzc1	10YR54 00					0	0	HR	1			M	
	55-68	hzc1	10YR54 00	10YR58 00	C	10YR63 00	S	0	0		0			M	
	68-120	zc	10YR54 00	10YR58 00	C	10YR63 00	S	0	0		0			M	
13	0-32	mzc1	10YR42 00					0	0	HR	2				
	32-68	mzc1	10YR44 00					0	0	HR	1			M	
	68-120	hzc1	10YR54 00	10YR58 00	C		S	0	0	HR	1			M	
14	0-35	mzc1	10YR43 00					0	0	HR	1				
	35-120	mzc1	10YR44 54					0	0		0			M	