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WEST SUSSEX MINERALS PLAN
SITE 36 : CHEESEMANS LANE
AGRICULTURAL LAND CLASSIFICATION
ALC MAP & REPORT
OCTOBER 1993

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AGRICULTURAL LAND CLASSIFICATION REPORT

1.0 Summary

1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality on a number of sites in West Sussex. The work forms part of MAFF's statutory input to the preparation of the West Sussex Minerals Plan.

1.2 Approximately 15 hectares of land relating to Site 36 north-west of Balsam's Farm, Funtington near Chichester was surveyed in October 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 12 soil auger borings and 2 soil inspection pits 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 conducted by members of the Resource Planning Team in the Guildford Statutory Group of ADAS.

1.4 At the time of the survey the land on the site had been recently cultivated and ploughed with cereals.

1.5 The distribution of 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 1:5,000. It is accurate at this scale, but any enlargement would be misleading. This map supersedes any previous survey information for the site.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% of Site
3b	14.6	99.3
Non-agricultural land	0.1	0.7
Total area of site	14.7	100.0

1.6 Appendix 1 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 All of the agricultural land on the site has been classified as Subgrade 3b, moderate quality land. Soils typically comprise medium silty clay loam topsoils which become heavier with depth. Soil profiles are very stony throughout, which poses a significant restriction on the profile available water for plant growth and the range of crops that can tolerate such conditions.

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 the 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 factors to influence soil wetness and soil droughtiness. At this locality, the soil moisture deficits are relatively high, thus increasing the risk of soil droughtiness.

2.4 No local climatic factors such as exposure or frost risk affect the site.

Table 2 : Climatic Interpolation

Grid Reference :	SU 791 076
Altitude (m) :	30
Accumulated Temperature (days) :	1516
Average Annual Rainfall (mm) :	825
Field Capacity (days) :	173
Moisture Deficit, Wheat (mm) :	110
Moisture Deficit, Potatoes (mm) :	106
Overall Climatic Grade :	1

3.0 Relief

3.1 The site is very slightly undulating and lies at an altitude of approximately 30m AOD. Nowhere on the site does relief or gradient impose any limitation to the land quality.

4.0 Geology and Soil

4.1 BGS Sheet 316, Fareham (1971) shows the entire site to be underlain by River and Valley Gravels with Coombe Deposits.

4.2 The soil type for the site, as shown on the Soil Survey map of South East England (SSEW, 1983, 1:250,000), comprises the Charity 1 Association. These soils are described as 'well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow over flint gravel' (SSEW, 1983). Detailed field examination confirms this, especially the flinty nature of the soils over the entire site.

5.0 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 All of the agricultural land surveyed has been classified as Subgrade 3b, moderate quality land. Soil droughtiness is the key limitation. Topsoils comprise medium silty clay loams and medium clay loams. These are underlain by similar textured upper subsoils. Lower subsoils, present from approximately 50-55cm, comprise either heavy (silty) clay loams or clays. All profiles are free draining and are thereby assigned to Wetness Class I. Topsoils are very stony (6-7% flints >2cm by volume; 45% total flints by volume), and pass into very stony (50% total flints by volume) upper subsoils. These upper subsoils generally proved impenetrable to an auger at approximately 45-50cm. Consequently, two soil inspection pits were dug in this mapping unit to investigate soil profile conditions at depth. It was found that the upper subsoils extend to approximately 55cm, and then pass

into slightly stonier (55-60% total flints by volume) lower subsoils. Pit 1 became impenetrable to digging at 60cm; Pit 2 at 65 cm. The impenetrable nature of these soils means that assumptions were made regarding the rooting depths and profile stoniness below these depths. The nature of the underlying geology has made it possible to assume that profiles will not become less stony at depth. It has been assumed that roots can penetrate at least a further 20cm into the profile from the depth reached by digging. The interaction between this restricted rooting, soil textures, profile stone contents and the moderate subsoil structural conditions with the local climatic regime results in a significant risk of drought stress. Consequently, this land can be graded as no better than Subgrade 3b. There is a significant restriction on the profile available water of this land and the range of crops that can tolerate such conditions.

Non-Agricultural

5.4 The Non-Agricultural land marked on the map is occupied by a small copse.

Resource Planning Team
Guildford Statutory Group
ADAS Reading

ADAS Ref : 4203/206/93
MAFF Ref : EL 42/00228

APPENDIX I

DESCRIPTION OF THE GRADES AND SUB-GRADES

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 on 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 root 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. When more demanding crops are grown yields are generally lower or more variable than on land in grades 1 and 2.

Sub-grade 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.

Sub-grade 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 very 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 : 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 re-claimed 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.

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

REFERENCES

* British Geological Survey (1971), Sheet No 316, Fareham, 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 Sets 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 III

DEFINITION OF SOIL WETNESS CLASSES

Wetness Class I

The soil profile is not wet within 70cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70cm depth for 31-90 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 70cm for more than 90 days, but not wet within 40cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70cm depth for 91-180 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 70cm for more than 180 days, but only wet within 40cm depth for 31-90 days in most years.

Wetness Class IV

The soil profile is wet within 70cm depth for more than 180 days but not wet within 40cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 40cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40cm depth for more than 335 days in most years.

(The number of days is not necessarily a continuous period. 'In most years' is defined as more than 10 out of 20 years.)

APPENDIX IV

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 database. This has commonly used notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF** : national 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 **HRT** : Horticultural Crops **PGR** : Permanent Pasture **LEY** : Ley Grass **RGR** : Rough Grazing
SCR : Scrub **CFW** : Coniferous Woodland **DCW** : Deciduous Woodland **HTH** : Heathland **BOG** : Bog or Marsh
FLW : Fallow **PLO** : Ploughed **SAS** : Set aside **OTH** : Other

3. **GRDNT** : Gradient as measured by a hand-held optical clinometer.

4. **GLEY/SPL** : Depth in cm to gleying or slowly permeable layers.

5. **AP (WHEAT/POTS)** : Crop-adjusted available water capacity.

6. **MB (WHEAT/POTS)** : Moisture Balance.

7. **DRT** : Best grade according to soil droughtiness.

8. If any of the following factors are considered significant, an entry of 'Y' will be entered in the relevant column.

MREL : Microrelief limitation **FLOOD** : Flood risk **EROSN** : Soil erosion risk **EXP** : Exposure limitation **FROST** : Frost
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** : Soil Erosion Risk **WD** : Combined 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
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 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

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

6. **STONE LITH** : One of the following is used.

HR : all hard rocks and stones **MSST** : soft, medium or coarse grained sandstone
SI : soft weathered igneous or metamorphic **SLST** : soft oolitic or dolimitic 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 (> 2cm, > 6cm 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 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

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 is impenetrable a 'Y' will appear in this column at the appropiate 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

SOIL PIT DESCRIPTION

Site Name : WSUSSEX MINS SITE 36 Pit Number : 1P

Grid Reference: SU79120777 Average Annual Rainfall : 825 mm
Accumulated Temperature : 1516 degree days
Field Capacity Level : 173 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 29	MZCL	10YR42 00	6	46		WDCSAB
29- 55	MZCL	10YR56 00	0	50		
55- 80	C	75YR56 00	0	60		

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

Drought Grade : 3B APW : 61 mm MBW : -49 mm
APP : 65 mm MBP : -41 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : WSUSSEX MINS SITE 36 Pit Number : 2P

Grid Reference: SU79270747 Average Annual Rainfall : 825 mm
Accumulated Temperature : 1516 degree days
Field Capacity Level : 173 days
Land Use : Cereals
Slope and Aspect : 01 degrees N

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 25	MCL	10YR42 00	7	45		WDCSAB
25- 52	MZCL	10YR54 00	0	50		
52- 85	C	10YR58 00	0	55		

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

Drought Grade : 3B APW : 62 mm MBW : -48 mm
APP : 64 mm MBP : -42 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	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SU79100780	CER					1	1	56	-54	56	-50	4				DR	4	IMPEN 35-Q DR
1P	SU79120777	CER					1	1	61	-49	65	-41	3B				DR	3B	PIT DUG TO 60
2	SU79200780	CER					1	1	61	-49	61	-45	3B				DR	3B	IMPEN 45
2P	SU79270747	CER	N	01			1	1	62	-48	64	-42	3B				DR	3B	PIT DUG TO 65
3	SU79300780	CER					1	1	94	-16	104	-2	3A				DR	3A	IMPEN 70
4	SU79100770	CER					1	1	68	-42	68	-38	3B				DR	3B	IMPEN 45
5	SU79200770	CER					1	1	67	-43	69	-37	3B				DR	3B	IMPEN 50
6	SU79300770	CER					1	1	82	-28	84	-22	3B				DR	3B	IMPEN 55
7	SU79100760	CER					1	1	68	-42	68	-38	3B				DR	3B	IMPEN 45
8	SU79200760	CER					1	1	66	-44	66	-40	3B				DR	3B	IMPEN 50
9	SU79300760	CER					1	1	100	-10	106	0	3A				DR	3A	IMPEN 75
10	SU79100750	CER	N	01			1	1	72	-38	72	-34	3B				DR	3B	IMPEN 50
11	SU79200750	CER					1	1	71	-39	73	-33	3B				DR	3B	IMPEN 55
12	SU79300750	CER					1	1	72	-38	72	-34	3B				DR	3B	IMPEN 45

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	0-26	mzcl	10YR42 00						4	0	HR	11						
	26-35	mzcl	10YR54 56						0	0	HR	25		M				
1P	0-29	mzcl	10YR42 00						6	0	HR	46	WDCSAB	FR		Y		
	29-55	mzcl	10YR56 00						0	0	HR	50		FM	M			
	55-80	c	75YR56 00						0	0	HR	60		FM	M			
2	0-25	mcl	10YR42 00						0	0	HR	15						
	25-40	mcl	10YR54 53						0	0	HR	30		M				
	40-45	mcl	10YR54 53						0	0	HR	40		M				
2P	0-25	mcl	10YR42 00						7	0	HR	45	WDCSAB	FR		Y		
	25-52	mzcl	10YR54 00						0	0	HR	50		FM	M			
	52-85	c	10YR58 00						0	0	HR	55		FM	M			
3	0-25	mzcl	10YR42 00						5	0	HR	12						
	25-40	mcl	75YR54 00						0	0	HR	15		M				
	40-70	hcl	75YR56 00						0	0	HR	15		M				
4	0-28	mzcl	10YR42 00						4	0	HR	11						
	28-40	mcl	10YR54 56						0	0	HR	25		M				
	40-45	hzcl	10YR56 00						0	0	HR	30		M				
5	0-25	mcl	10YR42 00						0	0	HR	15						
	25-55	mcl	10YR54 53						0	0	HR	40		M				
6	0-25	mzcl	10YR42 00						3	0	HR	10						
	25-55	hcl	10YR56 00						0	0	HR	15		M				
7	0-28	mzcl	10YR42 00						4	0	HR	13						
	28-40	mzcl	10YR56 00						0	0	HR	25		M				
	40-45	mzcl	10YR56 00						0	0	HR	30		M				
8	0-25	mcl	10YR42 00						0	0	HR	10						
	25-50	mcl	10YR54 00						0	0	HR	40		M				
9	0-25	mzcl	10YR42 00						4	0	HR	10						
	25-35	mcl	10YR54 00						0	0	HR	10		M				
	35-75	hcl	75YR56 00						0	0	HR	15		M				
10	0-28	mcl	10YR32 00						6	0	HR	15						
	28-50	mzcl	10YR56 00						0	0	HR	25		M				
11	0-25	mcl	10YR42 00						0	0	HR	15						
	25-55	mcl	10YR56 00						0	0	HR	30		M				
12	0-25	mzcl	10YR42 00						0	0	HR	9						
	25-45	mcl	10YR56 00						0	0	HR	12		M				