A1
WEST SUSSEX MINERALS PLAN
SITE 16 : ROCK COMMON,
LAND SOUTH OF THE A283
AGRICULTURAL LAND CLASSIFICATION
ALC MAP & REPORT
NOVEMBER 1993

WEST SUSSEX MINERALS PLAN
SITE 16 : ROCK COMMON, LAND SOUTH OF THE A283
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 5 hectares of land relating to site 16, Rock Common, south of the A283, West Sussex was surveyed in November 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 7 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 longterm 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 landuse on the site was stubble turnips and cereals.

1.5 The distribution of grades, subgrades and land use categories 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	% of Agricultural Area
2	2.6	55.3	66.7
3b	1.3	27.7	33.3
			100% (3.9ha)
Woodland	0.8	17.0	
Total area of site	4.7	100%	

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 The site has been classified as Grades 2 and 3b with soil droughtiness, wetness and workability being the key limitations. The majority of the site is classified as Grade 2 and comprises topsoils of medium clay loam becoming heavier with depth. These soils are well drained but suffer from a slight workability limitation related to the interaction of topsoil texture and climatic factors and are classified as Grade 2 accordingly. To the east of the site subsoils become sandy with depth reducing the availability of water for plant growth. Consequently, soils are limited to Grade 2 by slight droughtiness as well as workability. Land classified as Subgrade 3b is limited by wetness and workability and comprises heavy clay loam topsoils over poorly structured clay subsoils. Drainage through the profile is severely impaired and land can be classified no higher than Subgrade 3b.

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 annual average 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.

2.4 No local climatic factors such as exposure or frost risk affect the site. It should be noted that the local climate is quite wet in a regional context with high rainfall and high field capacity days. As a result climatic factors do interact with soil properties to affect soil wetness/workability and droughtiness limitations.

Table 2 : Climatic Interpolation

Grid Reference :	TQ 131 133
Altitude (m) :	60
Accumulated Temperature (days) :	1471
Average Annual Rainfall (mm) :	883
Field Capacity (days) :	183
Moisture Deficit, Wheat (mm) :	102
Moisture Deficit, Potatoes (mm) :	94
Overall Climatic Grade :	1

3.0 Relief

3.1 The site is flat and lies at an altitude of approximately 60 metres. Relief and gradient do not affect agricultural land quality.

4.0 Geology and Soil

4.1 The relevant geological sheet for the site, Sheet 318/333 (BGS, 1984) shows the underlying geology over the majority of the site to be Cretaceous Folkestone Beds with Quaternary Head deposits to the south and east.

4.2 The published soils information for the area, Sheet 6 (SSEW, 1983) shows the soils over the majority of the site to comprise the Wickham 4 association -"Slowly permeable seasonally waterlogged fine loamy over clayey and fine silty over clayey soils associated with similar clayey soils, often with brown subsoils" (SSEW, 1983). A detailed examination of the soils on the site found sandy textured soils to the north and clayey soils to the south.

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.

Grade 2

5.3 Land classified as grade 2 covers the majority of the site and comprises two soil types; one clayey and the other sandy. The clayey soil type of which pit 2 is typical experiences a slight workability limitation. Profiles typically comprise topsoils of medium clay loam containing 0-1% total flints over upper subsoils of stoneless medium or heavy clay loam. Lower subsoils consist of stoneless heavy clay loam or clay passing to loamy medium sand at depth. Soils are well drained, suffering neither a wetness or droughtiness limitation and are assigned to a wetness class of I. However, a slight workability limitation is experienced by the soils due to a medium topsoil texture interacting with climatic factors (field capacity days and average annual rainfall are relatively high) resulting in a classification of grade 2. The clay content in the topsoil means that the topsoil retains more water than sandy soils and is slower to return to a workable condition after wetting therefore restricting the utilisation of the land.

5.4 The second soil type; the sandy soils, of which pit 1 is typical, is limited by slight soil droughtiness and workability. Profiles typically comprise topsoils of medium clay loam containing 0-2% total flints over medium clay loam or medium sandy loam upper subsoils containing 0-3% total flints. Lower subsoils consist of medium sandy loam or loamy medium sand with 0-2% total flints passing to medium sand at depth. As with the clayey soils there are no wetness imperfections and the soils are assigned to a wetness class of I, but are limited to grade 2 due to slight workability limitation for the same reasons described above. Together with workability soils also experience a slight droughtiness limitation due to the interaction of sandy, free draining textures, profile stone content and climatic factors (moisture deficits for wheat and potatoes). This interaction reduces profile available water for crop growth and may give rise to drought stress during the drier parts of the year such that a classification of grade 2 is appropriate.

Subgrade 3b

5.5 Land classified as subgrade 3b is mapped to the south of the site. Profiles comprise topsoils of medium clay loam over upper subsoils of poorly structured slowly permeable clay. Soils are poorly drained and are assigned to a wetness class of IV. This combined with a medium topsoil texture and climatic factors results in a classification of subgrade 3b. This land experiences significant wetness and workability problems such that there are restrictions on trafficking, cultivations and grazing by livestock. One auger boring with a heavy topsoil and a wetness grade of 4 was encountered. This was not mapped separately as it was felt not to be representative of soils over the site.

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 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.

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 (1984), Sheet No.318/333, Brighton & Worthing, 1:50,000 scale.

* 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 No.6, "Soils of South East England", 1:250,000 scale 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 16 Pit Number : 1P

Grid Reference: TQ13243420 Average Annual Rainfall : 885 mm
Accumulated Temperature : 1472 degree days
Field Capacity Level : 184 days
Land Use :
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 30	MCL	10YR42 00	0	2		MDCSAB
30- 58	MSL	10YR43 00	0	3		WDCSAB
58- 98	LMS	75YR44 00	0	2		WKCSAB
98-120	MS	10YR68 00	0	0		WKCSAB

Wetness Grade : 2 Wetness Class : I
Gleying : cm
SPL : No SPL

Drought Grade : 2 APW : 124mm MBW : 22 mm
APP : 108mm MBP : 14 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Workability

SOIL PIT DESCRIPTION

Site Name : WSUSSEX MINS SITE 16 Pit Number : 2P

Grid Reference: TQ13131335 Average Annual Rainfall : 885 mm
Accumulated Temperature : 1472 degree days
Field Capacity Level : 184 days
Land Use :
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 28	MCL	10YR42 00	0	0		MDCSAB
28- 76	HCL	10YR43 00	0	1		MDCSAB
76-100	HCL	10YR64 00	0	1	C	MDCSAB
100-120	LMS	10YR58 00	0	1		WKCSAB

Wetness Grade : 2 Wetness Class : I
Gleying :076 cm
SPL : No SPL

Drought Grade : 1 APW : 144mm MBW : 42 mm
APP : 117mm MBP : 23 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Workability

SAMPLE NO.	GRID REF	USE	ASPECT GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	DRT	M.REL FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	TQ13101340	TUR				1	2	146	44	118	24	1				WK	2	
1P	TQ13243420	TUR				1	2	124	22	108	14	2				WK	2	PIT 120
2	TQ13201340	TUR				1	2	125	23	110	16	2				DR	2	
2P	TQ13131335	TUR	076			1	2	144	42	117	23	1				WK	2	
3	TQ13301340	TUR				1	2	163	61	113	19	1				WK	2	
4	TQ12971327	CER	025	025		4	4		0		0					WE	4	
5	TQ13101330	TUR	0	100		2	3A	151	49	119	25	1				WE	3A	
6	TQ13101335	TUR				1	2	155	53	117	23	1				WK	2	
7	TQ13091328	CER	020	030		4	3B		0		0					WE	3B	

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	0-30	mcl	10YR42 00						0	0		0						
	30-70	hcl	10YR54 00						0	0		0		M				
	70-120	c	10YR56 00						0	0		0		M				
1P	0-30	mcl	10YR42 00						0	0	HR	2	MDCSAB	FM				
	30-58	msl	10YR43 00						0	0	HR	3	WDCSAB	FR	G			
	58-98	lms	75YR44 00						0	0	HR	2	WKCSAB	VF	M			
	98-120	ms	10YR68 00						0	0		0	WKCSAB	VF	M			
2	0-30	mcl	10YR42 00						0	0		0						
	30-55	mcl	10YR54 00						0	0		0		M				
	55-60	msl	10YR53 00						0	0		0		G				
	60-100	lms	10YR56 00						0	0		0		M				
	100-120	ms	10YR58 00						0	0		0		M				
2P	0-28	mcl	10YR42 00						0	0		0	MDCSAB	FM				
	28-76	hcl	10YR43 00						0	0	HR	1	MDCSAB	FR	M			
	76-100	hcl	10YR64 00	75YR56 00	C			Y	0	0	HR	1	MDCSAB	FM	M			
	100-120	lms	10YR58 00						0	0	HR	1	WKCSAB	VF	M			
3	0-25	mcl	10YR42 00						0	0		0						
	25-85	scl	10YR54 00						0	0		0		M				
	85-120	msl	10YR53 00						0	0		0		G				
4	0-25	hcl	10YR42 00						0	0		0						
	25-120	c	10YR53 00	10YR58 61	M			Y	0	0		0		P			Y	
5	0-38	mcl	10YR53 00	10YR56 00	C			Y	0	0	HR	1						
	38-48	hcl	10YR53 54						0	0		0		M				
	48-100	hcl	10YR53 64	75YR56 00	C			Y	0	0		0		M				
	100-120	c	10YR63 64	75YR56 00	M	00MN00	00	Y	0	0		0		P			Y	
6	0-25	mcl	10YR42 00						0	0		0						
	25-40	mcl	10YR53 00						0	0		0		M				
	40-85	hcl	10YR56 00						0	0		0		M				
	85-120	hcl	10YR56 00	10YR58 00	F				0	0		0		M				
7	0-20	mcl	10YR42 00						0	0	HR	1						
	20-30	hcl	10YR42 00	75YR56 00	C			Y	0	0		0		M				
	30-120	c	10YR63 53	75YR58 00	M			Y	0	0		0		P			Y	