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WEST SUSSEX MINERALS PLAN  
SITE 8: WEST STOKE ROAD  
AGRICULTURAL LAND CLASSIFICATION  
ALC MAP & REPORT  
OCTOBER 1993

**WEST SUSSEX MINERALS PLAN  
SITE 8: WEST STOKE ROAD  
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 13 hectares of land relating to Site 8: West Stoke Road near Chichester was surveyed in October 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 15 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 land had been recently ploughed.

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

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Site</u>	<u>% of Agricultural Area</u>
3a	8.2	65.1	78.4
3b	2.0	15.9	21.6
Woodland	2.4	19.0	100% (10.2 ha)
Total area of site	12.6	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 Subgrades 3a and 3b, soil droughtiness being the key limitation. Land classified as Subgrade 3a covers the majority of the site and experiences a moderate droughtiness and/or topsoil stone limitation. Medium textured profiles become heavier with depth and are moderately stony throughout reducing available water for plant growth such that a classification of Subgrade 3a is appropriate. Land classified as Subgrade 3b experiences a significant droughtiness and/or topsoil stone limitation. Medium textured profiles are moderately stony in the topsoil and very stony in the subsoil, this severely reduces available water such that the land can be classified as 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 the 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. However the relatively high moisture deficits do interact with soil properties to increase the risk of a soil droughtiness limitation.

Table 2 : Climatic Interpolation

Grid Reference :	SU 846 070
Altitude (m) :	30
Accumulated Temperature (days) :	1515
Average Annual Rainfall (mm) :	818
Field Capacity (days) :	169
Moisture Deficit, Wheat (mm) :	113
Moisture Deficit, Potatoes (mm) :	108
Overall Climatic Grade :	1

### **3.0 Relief**

3.1 The site is flat and lies at an altitude of approximately 30 metres. Nowhere on the site does altitude or relief affect agricultural land quality.

### **4.0 Geology and Soil**

4.1 The relevant geological sheet for the site, Sheet 317 (BGS, 1972) shows the underlying geology to be Recent and Pleistocene Valley Gravel.

4.2 The published soils information for the area, Sheet 6 (SSEW, 1983) shows the soils on the site to comprise the Charity 1 association "Well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow over flint gravel" (SSEW, 1983). A detailed inspection of soils on the site broadly confirmed the presence of soils similar to those described above.

### **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 3a**

5.3 Land classified as subgrade 3a covers the majority of the site. Soil profiles typically comprise topsoils of medium clay loam containing 17-25% total flints by volume of which 9-14% were > 2cm diameter. Upper subsoils consist of medium clay loam containing 1-35% total flints over lower subsoils of heavy clay loam or clay containing 3-35% total flints. Soils are well drained and are assigned to wetness class of I. However they do experience a moderate soil droughtiness limitation. The combination of soil textures, profile stone volumes and climatic factors reduce available water in the profile for crop growth such that a

classification of subgrade 3a is appropriate. Together with this limitation some soil profiles within this map unit are also limited to the same grade due to stone volumes in excess of 10% > 2 cm diameter in the top 25 cm of soil. Such stone volumes can increase production costs by causing wear and tear to farm machinery and impair crop establishment.

### **Subgrade3b**

5.4 Moderate quality agricultural land is mapped to the north west of the site. Here, soil profiles proved to be impenetrable to the auger. However, soil pit 1 which is typical of these soils was dug to assess the subsoil. From this soil profiles were found to comprise topsoils of medium clay loam containing 20-27% total flints by volume of which 12-16% were > 2 cm diameter. Upper subsoils consist of the same texture containing 50% total flints over lower subsoils, again of medium clay loam containing 55% total flints by volume. Soils do not suffer a wetness limitation and are assigned to a wetness class of I, but they do experience a significant droughtiness limitation. The high volumes of stone in the profile, the medium soil textures and climatic factors combine to reduce available water to a greater degree than that of land classified as subgrade 3a. Consequently land can be classified no higher than subgrade 3b. Occasionally stone volumes in excess of 15% > 2 cm diameter in the top 25 cm of soil limits land to the same grade.

ADAS REFERENCE : 4203/209/93  
MAFF REFERENCE : EL 42/00228

Resource Planning Team  
Guildford Statutory Group  
ADAS Reading

## 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 (1972), Sheet No.317, Chichester, 1:63,360 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 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 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 appropriate 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 : W.SSX - WEST STOKE RD, 8 Pit Number : 1P

Grid Reference: SU84820715 Average Annual Rainfall : 818 mm  
 Accumulated Temperature : 1515 degree days  
 Field Capacity Level : 169 days  
 Land Use : Bare Soil  
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 29	MCL	10YR42 00	12	27		WKCSAB
29- 60	MCL	10YR44 00	0	50		
60-120	MCL	10YR44 00	0	55		

Wetness Grade : 1 Wetness Class : I  
 Gleying : cm  
 SPL : cm

Drought Grade : 3B APW : 91 mm MBW : -22 mm  
 APP : 73 mm MBP : -35 mm

FINAL ALC GRADE : 3B  
 MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : W.SSX - WEST STOKER RD, 8 Pit Number : 2P

Grid Reference: SU84770696 Average Annual Rainfall : 818 mm  
 Accumulated Temperature : 1515 degree days  
 Field Capacity Level : 169 days  
 Land Use : Bare Soil  
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 43	MCL	10YR42 00	12	24		WKCSAB
43- 70	MCL	10YR44 00	0	5		MDCSAB
70- 75	HCL	10YR56 00	0	35		
75-120	C	10YR56 00	0	35		

Wetness Grade : 1 Wetness Class : I  
 Gleying : cm  
 SPL : cm  
 Drought Grade : 3A APW : 117mm MBW : 4 mm  
 APP : 101mm MBP : -7 mm

FINAL ALC GRADE : 3A  
 MAIN LIMITATION : Topsoil Stoniness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
					GLEYS	SPL	CLASS	GRADE	AP	MB	AP	MB					
1	SU84800720	PLO			1	1	69	-44	69	-39	3B				DR	3B	IMP50 Q3BDR
1P	SU84820715	PLO			1	1	91	-22	73	-35	3B				DR	3B	PIT 70
2	SU84900720	PLO			1	1	129	16	113	5	2				ST	3A	STONES
2P	SU84770696	PLO			1	1	117	4	101	-7	3A				ST	3A	PIT 80
3	SU84700710	PLO	E	02	1	1	48	-65	48	-60	4				DR	4	IMP35 Q3BDR
4	SU84800710	PLO			1	1	42	-71	42	-66	4				DR	4	3BST DR
5	SU84900710	PLO			1	1	74	-39	77	-31	3B				DR	3B	IMP55 Q3ADR+ST
6	SU84640698	PLO			1	1	93	-20	99	-9	3A				DR	3B	IMP 80 3ADR+ST
7	SU84700700	PLO			1	1	81	-32	86	-22	3B				DR	3B	IMP62 Q3ADR+ST
8	SU84800700	PLO			1	1	92	-21	103	-5	3B				DR	3B	IMP 70 3ADR+ST
9	SU84900700	PLO			1	1	87	-26	95	-13	3B				DR	3B	IMP65 Q3ADR+ST
10	SU84700690	PLO	E	01	1	1	134	21	107	-1	2				ST	3A	STONES
11	SU84800690	PLO			1	1	58	-55	58	-50	4				DR	4	IMP 40 Q3BDR
12	SU84930692	PLO			1	1	91	-22	101	-7	3B				DR	3A	IMP 65 Q3ADR
13	SU84800680	PLO			1	1	64	-49	64	-44	3B				DR	3B	IMP45 Q3A3BDR
14	SU84660707	PLO	E	01	1	1	44	-69	44	-64	4				DR	4	IMP 30 Q3BDR
15	SU84900670	PLO			1	1	118	5	100	-8	2				ST	3A	STONES

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES----			STRUCT/ CONSIST	SUBS					
				COL	ABUN	CONT		GLE	>2	>6		LITH	TOT	STR	POR	IMP	SPL
1	0-35	mc1	10YR42 00					12	0	HR	20						
	35-50	mc1	10YR43 00					0	0	HR	25						M
1P	0-29	mc1	10YR42 00					12	0	HR	27	WKCSAB	FR				
	29-60	mc1	10YR44 00					0	0	HR	50		FR	M			
	60-120	mc1	10YR44 00					0	0	HR	55		FR	M			
2	0-30	mzc1	10YR42 00					12	0	HR	20						
	30-50	mzc1	10YR44 00					0	0	HR	5						M
	50-70	hzc1	10YR56 00					0	0		0						M
	70-110	c	75YR58 00					0	0	HR	5						M
2P	0-43	mc1	10YR42 00					12	0	HR	24	WKCSAB	FR				
	43-70	mc1	10YR44 00					0	0	HR	5	MDCSAB	FR	M			
	70-75	hc1	10YR56 00					0	0	HR	35		FM	M			
	75-120	c	10YR56 00					0	0	HR	35		FM	M			
3	0-27	mc1	10YR42 00					12	0	HR	20						
	27-35	mc1	10YR42 00					0	0	HR	32						M
4	0-30	mc1	10YR42 00					16	0	HR	24						
5	0-35	mc1	10YR42 00					14	0	HR	25						
	35-55	hc1	10YR52 00					0	0	HR	10						M
6	0-30	mc1	10YR42 00					12	0	HR	20						
	30-55	mc1	10YR56 00					0	0	HR	20						M
	55-80	c	10YR58 00					0	0	HR	5						M Y
7	0-27	mzc1	10YR42 00					11	0	HR	20						
	27-58	mc1	10YR44 00					0	0	HR	20						M
	58-62	mc1	10YR56 00					0	0	HR	30						M
8	0-30	mc1	10YR42 00					12	0	HR	20						
	30-55	mc1	10YR43 00					0	0	HR	10						M
	55-70	hc1	75YR46 00					0	0	HR	5						M
9	0-30	mzc1	10YR42 00					14	0	HR	25						
	30-40	mzc1	10YR52 00					0	0	HR	10						M
	40-65	hc1	10YR54 00					0	0	HR	10						M
10	0-30	mc1	10YR42 00					12	0	HR	20						
	30-67	mc1	10YR44 00					0	0	HR	1						M
	67-120	c	10YR58 00					0	0	HR	3						M Y
11	0-30	mc1	10YR42 00					9	0	HR	17						
	30-40	mc1	10YR43 00					0	0	HR	20						M

SAMPLE	DEPTH	TEXTURE	COLOUR	---MOTTLES---			PED		---STONES---			STRUCT/ CONSIST	SUBS				
				COL	ABUN	CONT	COL.	GLEY	>2	>6	LITH		TOT	STR	POR	IMP	SPL
12	0-25	mzc1	10YR43 00						8	0	HR	16					
	25-55	hzc1	10YR54 00						0	0	HR	10			M		
	55-65	c	75YR58 00						0	0	HR	10			M		
13	0-30	mc1	10YR42 00						9	0	HR	18					
	30-45	mc1	10YR52 00						0	0	HR	20			M		
14	0-30	mc1	10YR42 00						14	0	HR	20					
15	0-25	mc1	10YR42 00						13	0	HR	23					
	25-60	hc1	10YR52 00						0	0	HR	12			M		
	60-110	c	10YR58 00	00MNOO	00	F			0	0	HR	5			M		