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West Sussex Minerals Plan
Objector Site 50: Common Road, Funtington.
Agricultural Land Classification
ALC Map and Report
July 1995

AGRICULTURAL LAND CLASSIFICATION REPORT

WEST SUSSEX MINERALS PLAN
OBJECTOR SITE 50: COMMON ROAD, FUNTINGTON.

1. Summary

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

1.2 The site comprises approximately 7 hectares of land to the south of Common Road and west of Chessmans Lane at Funtington in West Sussex. An Agricultural Land Classification (ALC) survey was carried out during July 1995. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 8 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 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 land on the site comprised recently harvested barley.

1.5 The distribution of grades and subgrades is shown on the attached ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement would be misleading.

1.6 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.

1.7 All of the land on the site (7.6 ha.) has been classified as Subgrade 3b, moderate quality land, with soil droughtiness as the main limitation. Soils on the site tend to comprise stony medium silty clay loam topsoils overlying increasingly stony subsoils of a similar texture. Consequently, these dry and stony soils proved impenetrable to the auger at relatively shallow depths. Therefore a soil inspection pit was dug to assess the nature of the subsoils. Evidence from the pit suggests that the combination of soil textures, stone contents and the local climatic regime results in a significant restriction upon the amount of profile available water for plant growth. This can affect the level and consistency of crop yields, such that a classification of Subgrade 3b due to droughtiness is appropriate. Furthermore, a number of topsoil stone measurements on the site found the volume of stones greater than 2cm in size to exceed 15%. Excessively stony topsoils can inhibit crop growth and establishment, and can increase production costs due to wear and tear on machinery and tyres.

2. Climate

2.1 The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe climatic 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.

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 However, climatic factors do interact with soil factors to influence soil wetness and droughtiness limitations. At this location , the field capacity days are relatively high in a regional context and therefore the likelihood of any soil wetness problems may be increased.

2.5 No local climatic factors such as exposure or frost risk are believed to affect the site.

Table 2 : Climatic Interpolations

Grid Reference	SU 788 081
Altitude (m)	35
Accumulated Temperature (Day °C, Jan-June)	1510
Average Annual Rainfall (mm)	837
Field Capacity (days)	176
Moisture Deficit, Wheat (mm)	109
Moisture Deficit, Potatoes (mm)	104
Overall Climatic Grade	1

3. Relief

3.1 The site is flat, lying at an altitude of approximately 35m (AOD). Nowhere on the site do altitude or relief pose any limitation to agricultural use.

4. Geology and Soils

4.1 The published geological map (BGS, 1971) shows the underlying geology of the site to comprise river and valley gravel with coombe deposits.

4.2 The published Soil Survey map (SSGB, 1967) shows the soils on the site to comprise the extremely flinty phase of the Charity series. These are described as 'well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow over flint gravel' (SSEW, 1983).

4.3 Detailed field examination broadly confirms the published map. Soils across the site typically comprise medium silty clay loam topsoils and subsoils which become very stony with depth.

5. Agricultural Land Classification

5.1 The location of the soil observation points are shown on the attached sample point map.

Subgrade 3b

5.2 The majority of the land within this mapping unit is restricted by a significant droughtiness limitation. Soils on the site proved impenetrable to the auger at depths of 20-40cm due to stony subsoils. Impenetrability may have been exacerbated by the hot and dry conditions at the time of survey. A soil inspection pit (pit 1) was dug to investigate the nature of these soils. At the location of the pit, a moderately stony (25% total flints v/v, 16% > 2cm size) medium silty clay loam topsoil rests upon a similar textured upper subsoil containing 35% total flints v/v and extending to a depth of 45cm. A very stony (55% total flints v/v) medium silty clay loam lower subsoil was found to extend to a depth of 70cm. The soil inspection pit became impenetrable to digging at a depth of 70cm, and for the purposes of calculating profile available water it has been assumed that the very stony medium silty clay loam horizon extends to a depth of at least 120cm. A combination of soil textures, stone contents and the local climatic regime means that there is a significant restriction upon the amount of profile available water for plant growth. This will affect the level and consistency of crop yields such that a classification of Subgrade 3b is appropriate.

5.3 Topsoil stone measurements on the site found that the volume of flints greater than 2cm in size across much of the site are sufficiently high to limit the land to a classification of Subgrade 3b. The main effects of stones are to act as an impediment to cultivation, harvesting and crop growth and to cause a reduction in the available water capacity of a soil. A high topsoil stone content can increase production costs by causing extra wear and tear to implements and tyres. Crop quality may also be reduced, as can the establishment of precision drilled crops.

ADAS Ref: 4203/083/95
MAFF Ref: EL 42/228

Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1971), Sheet No. 316, Fareham, 1:50,000 Series (drift edition).

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 6, Soils of South East England, 1:250,000 and accompanying legend.

Soil Survey of Great Britain (1967), Sheets SU70 and 80, 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.

[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 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. **GLEY** : 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 **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 : WSUSSEX MINS OBJ SITE 50 Pit Number : 1P

Grid Reference: SU78800805 Average Annual Rainfall : 837 mm
Accumulated Temperature : 1517 degree days
Field Capacity Level : 176 days
Land Use :
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 24	MZCL	10YR43 00	16	25	HR					
24- 45	MZCL	10ZZ00 00	0	35	HR				M	
45-120	MZCL	00ZZ00 00	0	55	HR				P	

Wetness Grade : 2 Wetness Class : I
Gleying :000 cm
SPL : No SPL

Drought Grade : 3B APW : 083mm MBW : -26 mm
APP : 074mm MBP : -30 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	ASPECT USE	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	SU78700810	STB		000		1	2	050	-59	050	-54	4				DR	3B	I30 SEE 1P
1P	SU78800805	STB		000		1	2	083	-26	074	-30	3B				DR	3B	PIT 70
2	SU78800810	STB		000		1	2	041	-68	041	-63	4				DR	3B	I25 SEE 1P
3	SU78900810	STB		000		1	2	052	-57	052	-52	4				DR	3B	I35 SEE 1P
4	SU79000810	STB		000		1	2	029	-80	029	-75	4				ST	3B	I20 SEE 1P
5	SU78700800	STB		000		1	2	029	-80	029	-75	4				DR	3B	I20 SEE 1P
6	SU78800800	STB		000		1	2	059	-50	059	-45	4				DR	3B	I40 SEE 1P
7	SU78900800	STB		000		1	2	046	-63	046	-58	4				DR	3B	I30 SEE 1P
8	SU79000800	STB		000		1	2	039	-70	039	-65	4				DR	3B	I25 SEE 1P

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	10YR43 00						6	0	HR	10							
	25-30	mzcl	10YR43 00						0	0	HR	25		M					
1P	0-24	mzcl	10YR43 00						16	0	HR	25							TOPSOIL STONE
	24-45	mzcl	10YR43 00						0	0	HR	35		M					
	45-120	mzcl	10YR44 00						0	0	HR	55		P					
2	0-25	mzcl	10YR43 00						10	0	HR	15							
3	0-25	mzcl	10YR43 00						10	0	HR	18							
	25-35	mzcl	10YR43 44						0	0	HR	25		M					
4	0-20	mzcl	10YR43 00						17	0	HR	25							TOPSOIL STONE
5	0-20	mzcl	10YR43 00						12	0	HR	25							
6	0-28	mzcl	10YR43 00						10	0	HR	20							
	28-40	mzcl	10YR54 00						0	0	HR	25		M					
7	0-30	mzcl	10YR43 00						12	0	HR	20							
8	0-25	mzcl	10YR43 00						10	0	HR	20							