

A1
West Sussex Minerals Plan
Objector Site 51: Convent Land.
Agricultural Land Classification
ALC Map and Report
June 1995

AGRICULTURAL LAND CLASSIFICATION REPORT

WEST SUSSEX MINERALS PLAN OBJECTOR SITE 51: CONVENT LAND.

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 north of the Convent situated alongside the A27 to the south of Chichester in West Sussex. An Agricultural Land Classification (ALC) survey was carried out during June 1995. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 5 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 a short crop of peas, and some rough grassland.
- 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 (6.6 ha.) has been classified as Subgrade 3b, moderate quality land, with soil droughtiness and topsoil stoniness as the main limitations. Soils on the site tend to comprise stony medium silty clay loams overlying gravel (i.e. >70% stone) at relatively shallow depths. A combination of soil textures, structures and the local climatic regime means that there is 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. Where the volume of topsoil stones greater than 2cm in size exceeds 15% on the site, a significant topsoil stoniness limitation will restrict the land to Subgrade 3b.

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. Moisture deficits are relatively high in a regional context at this location, therefore the likelihood of soil droughtiness 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 868 035 |
| Altitude (m) | 9 |
| Accumulated Temperature (Day °C, Jan-June) | 1540 |
| Average Annual Rainfall (mm) | 764 |
| Field Capacity (days) | 156 |
| 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 9m (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, 1972) shows the underlying geology of the site to comprise valley gravel.
- 4.2 The published Soil Survey map (SSGB, 1967) shows the soils on the site to comprise those of the Gade series. These are described as 'shallow calcareous and non-calcareous loamy soils over flint gravel affected by groundwater' (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 20-30cm 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 slightly stony (15% total flints v/v, 13% > 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 40cm. A very stony (50% total flints v/v) medium silty clay loam lower subsoil was found to extend to a depth of 60cm, where gravel (i.e. containing >70% flints) was encountered. The soil inspection pit became impenetrable to digging at a depth of 65cm, and for the purposes of calculating profile available water it has been assumed that gravel extends to a depth of at least 120cm. If roots were able to penetrate the gravel, the amount of available water would be limited. 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: 4203/128/95
MAFF Ref: EL 42/228

Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1972), Sheet No. 317, Chichester, 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 SU80, 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 PIT DESCRIPTION

Site Name : CONVENT LAND

Pit Number : 1P

Grid Reference: SU86800350 Average Annual Rainfall : 764 mm
 Accumulated Temperature : 1540 degree days
 Field Capacity Level : 156 days
 Land Use : Peas
 Slope and Aspect : degrees

| HORIZON | TEXTURE | COLOUR | STONES >2 | TOT.STONE | LITH | MOTTLES | STRUCTURE | CONSIST | SUBSTRUCTURE | CALC |
|---------|---------|-----------|-----------|-----------|------|---------|-----------|---------|--------------|------|
| 0- 20 | MZCL | 10YR42 00 | 13 | 15 | HR | | | | | |
| 20- 40 | MZCL | 10YR42 43 | 0 | 35 | HR | | | | M | |
| 40- 60 | MZCL | 10YR43 00 | 0 | 50 | HR | | | | M | |
| 60-120 | GH | 00Z200 00 | 0 | 0 | | | | | M | |

Wetness Grade : 1 Wetness Class : I
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 3B APW : 076mm MBW : -43 mm
 APP : 075mm MBP : -38 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Droughtiness

| SAMPLE NO. | GRID REF | ASPECT USE | --WETNESS-- | | -WHEAT- | | -POTS- | | M.REL | | EROSN | FROST | CHEM | ALC | COMMENTS | |
|------------|------------|------------|-------------|---------|---------|-------|--------|-----|-------|-----|-------|-------|------|------|----------|------------|
| | | | GRDNT | GLEYSPL | CLASS | GRADE | AP | MB | AP | MB | DRT | FLOOD | EXP | DIST | | LIMIT |
| 1 | SU86800356 | PEA | 000 | | 1 | 1 | 039 | -80 | 039 | -74 | 4 | | | DR | 38 | I25 SEE 1P |
| 1P | SU86800350 | PEA | 000 | | 1 | 1 | 076 | -43 | 075 | -38 | 3B | | | DR | 38 | PIT TO 65 |
| 2 | SU86700350 | PEA | 000 | | 1 | 1 | 043 | -76 | 043 | -70 | 4 | | | DR | 38 | I25 SEE 1P |
| 3 | SU86800350 | PEA | 000 | | 1 | 1 | 034 | -85 | 034 | -79 | 4 | | | DR | 38 | I20 SEE 1P |
| 4 | SU86700340 | PEA | 000 | | 1 | 1 | 000 | 0 | 000 | 0 | | | | ST | 38 | SIEVED |
| 5 | SU86800340 | PEA | 000 | | 1 | 1 | 051 | -68 | 051 | -62 | 4 | | | DR | 38 | I30 SEE 1P |

| SAMPLE | DEPTH | TEXTURE | COLOUR | ----MOTTLES---- | | | PED COL. | ----STONES---- | | | | STRUCT/ CONSIST | SUBS | | | | | |
|--------|--------|---------|-----------|-----------------|------|------|-------------|----------------|----|----|------|--------------------|------|-----|-----|-----|-----|------|
| | | | | COL | ABUN | CONT | | GLEY | >2 | >6 | LITH | | TOT | STR | POR | IMP | SPL | CALC |
| 1 | 0-25 | mzc1 | 10YR42 00 | | | | | 10 | 0 | HR | 20 | | | | | | | |
| 1P | 0-20 | mzc1 | 10YR42 00 | | | | | 13 | 0 | HR | 15 | | | | | | | |
| | 20-40 | mzc1 | 10YR42 43 | | | | | 0 | 0 | HR | 35 | | | M | | | | |
| | 40-60 | mzc1 | 10YR43 00 | | | | | 0 | 0 | HR | 50 | | | M | | | | |
| | 60-120 | gh | 00ZZ00 00 | | | | | 0 | 0 | | 0 | | | M | | | | |
| 2 | 0-25 | mzc1 | 10YR42 00 | | | | | 5 | 0 | HR | 10 | | | | | | | |
| 3 | 0-20 | mzc1 | 10YR42 00 | | | | | 5 | 0 | HR | 12 | | | | | | | |
| 4 | 0-25 | mzc1 | 10YR42 00 | | | | | 17 | 0 | HR | 30 | | | | | | | |
| 5 | 0-20 | mzc1 | 10YR42 00 | | | | | 5 | 0 | HR | 8 | | | | | | | |
| | 20-30 | mzc1 | 10YR44 00 | | | | | 0 | 0 | HR | 10 | | | M | | | | |