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WEST SUSSEX MINERALS PLAN  
SITE 34: HAMBROOK WEST  
AGRICULTURAL LAND CLASSIFICATION  
ALC MAP & REPORT  
OCTOBER 1993

**WEST SUSSEX MINERALS PLAN  
SITE 34: HAMBROOK WEST  
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 4 hectares of land relating to Site 34 north of Little Hambrook Farm, Funtington near Chichester was surveyed in October 1993. The survey was undertaken at a detailed level of approximately two borings per hectare. A total of 7 soil auger borings and 1 soil inspection pit 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 landuses on the site were field beans and set-aside.

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 this site.

Table 1 : Distribution of Grades and Subgrades

| <u>Grade</u> | <u>Area (ha)</u> | <u>% of Site</u> |
|--------------|------------------|------------------|
| 3b           | 4.1              | 93.2             |
| Woodland     | 0.3              | <u>6.8</u>       |
| Total        | 4.4              | <u>100.0</u>     |

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, with soil droughtiness as the key limitation. Soils typically comprise moderately stony medium silty clay loam topsoils with similar textures prevailing in the subsoil, becoming very stony with depth. The high stone volumes in these soils significantly restrict 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 (degree days Jan-June), 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, climatic factors do interact with soil factors to influence soil wetness and droughtiness limitations. In the locality of this particular site, field capacity days are relatively high, with correspondingly low moisture deficits.

Table 2 : Climatic Interpolations

|                                   |            |
|-----------------------------------|------------|
| Grid Reference :                  | SU 777 087 |
| Altitude (m) :                    | 25         |
| Accumulated Temperature (days) :  | 1522       |
| Average Annual Rainfall (mm) :    | 834        |
| Field Capacity (days) :           | 176        |
| Moisture Deficit, Wheat (mm) :    | 110        |
| Moisture Deficit, Potatoes (mm) : | 106        |
| Overall Climatic Grade :          | 1          |

## 3.0 Relief

3.1 The site is slightly undulating lying at an altitude in a range between 25 and 35 metres. On no part of the site does gradient or relief pose any limitation to agricultural use.

## 4.0 Geology and Soil

4.1 The relevant geological sheet for the site (BGS Sheet 316: Fareham 1971) shows the underlying geology to be River and Valley Gravels with Coombe Deposits. There is also a very small band of Upper Chalk running along the narrowest part of the site.

4.2 The published soils information for the area (SSEW Sheet 6: Soils of South East England 1983) shows the soils on the site to be of the Charity 1 association. These are described as well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow over flint gravel. Detailed field examination confirms this, particularly the locally shallow and flinty nature of the soils on some parts of the 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.

5.3 Subgrade 3b: All of the agricultural land on the site has been classified as Subgrade 3b, moderate quality land, with soil droughtiness as the main limitation. The majority of soil augerings in these soils proved to be impenetrable below the topsoil. Therefore, a subsequent soil inspection pit (Pit 1) was dug to assess the condition of the subsoils on the site. The pit showed the existence of a medium silty clay loam topsoil containing 35% total flints by volume. A similar texture prevails throughout the profile although stone contents do increase. An upper subsoil containing 45% total flints by volume extends to 42cm, overlies a lower subsoil containing 60% total flints by volume which proved impenetrable to digging at 70cm. The impenetrable nature of these soils means that a number of assumptions regarding rooting depths and stone contents below this depth had to be made, for the purpose of assessing the droughtiness of these soils. The underlying geology for the site makes it possible to assume that profiles will not become any less stony. Furthermore, it was assumed that roots are able to penetrate a further 20cm below the level at which the soils became impenetrable to digging. Due to the interaction of soil characteristics such as textures, substructural conditions and profile stone contents with climatic factors, these soils show a significant limitation on the amount of profile available water for crop growth. There is also a restriction on the range of crops that can tolerate such conditions. This droughtiness limitation means that the agricultural land on the site can be classified as no better than Subgrade 3b. It should be noted that boring no. 1 showed a less stony soil profile which is classified as Grade 2, corresponding with the small band of chalk on the site. Yet this soil type is not regarded as sufficiently extensive to warrant mapping as a separate unit.

5.4 There is a small area of woodland in the north of the site.

ADAS REFERENCE : 4203/204/93  
MAFF REFERENCE : EL42/00228

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 (1957), Sheet No.317, Chichester, 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 for Agricultural Land Classification.
- \* Soil Survey of England and Wales (1983), Sheet No.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 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 : WSUSSEX MINS SITE 34 Pit Number : 1P

Grid Reference: SU77650853 Average Annual Rainfall : 841 mm  
 Accumulated Temperature : 1510 degree days  
 Field Capacity Level : 177 days  
 Land Use :  
 Slope and Aspect : degrees

| HORIZON | TEXTURE | COLOUR    | STONES >2 | TOT.STONE | MOTTLES | STRUCTURE |
|---------|---------|-----------|-----------|-----------|---------|-----------|
| 0- 27   | MZCL    | 10YR44 00 | 7         | 35        |         | WDCSAB    |
| 27- 42  | MZCL    | 10YR54 00 | 0         | 45        |         |           |
| 42- 90  | MZCL    | 10YR54 00 | 0         | 60        |         |           |

Wetness Grade : 2 Wetness Class : I  
 Gleying : cm  
 SPL : cm

Drought Grade : 3B APW : 72 mm MBW : -37 mm  
 APP : 70 mm MBP : -34 mm

FINAL ALC GRADE : 3B  
 MAIN LIMITATION : Droughtiness

| SAMPLE NO. | GRID REF   | USE | ASPECT | GRDNT | SPL | --WETNESS-- |       | -WHEAT- |     | -POTS- |     | M.REL |       | EROSN | FROST | CHEM  | ALC   | COMMENTS      |
|------------|------------|-----|--------|-------|-----|-------------|-------|---------|-----|--------|-----|-------|-------|-------|-------|-------|-------|---------------|
|            |            |     |        |       |     | CLASS       | GRADE | AP      | MB  | AP     | MB  | DRT   | FLOOD | EXP   | DIST  | LIMIT |       |               |
| 1          | SU77700870 | SAS | N      | 02    |     | 1           | 2     | 118     | 9   | 110    | 6   | 2     |       |       |       |       | DR 2  | CHALKY        |
| 1P         | SU77650853 | BEA |        |       |     | 1           | 2     | 72      | -37 | 70     | -34 | 3B    |       |       |       |       | DR 3B | PIT DUG TO 70 |
| 2          | SU77700860 | SAS | N      | 05    |     | 1           | 2     | 59      | -50 | 59     | -45 | 3B    |       |       |       |       | DR 4  | IMPEN 38      |
| 3          | SU77700850 | BEA |        |       |     | 1           | 2     | 60      | -49 | 60     | -44 | 3B    |       |       |       |       | DR 4  | IMPEN 35      |
| 4          | SU77600840 | BEA |        |       |     | 1           | 2     | 85      | -24 | 88     | -16 | 3B    |       |       |       |       | DR 3B | IMPEN 55      |
| 5          | SU77700840 | BEA |        |       |     | 1           | 2     | 60      | -49 | 60     | -44 | 3B    |       |       |       |       | DR 4  | IMPEN 35      |
| 6          | SU77660877 | SAS |        |       |     | 1           | 2     | 109     | 0   | 90     | -14 | 3A    |       |       |       |       | DR 3A | IMPEN 45      |
| 7          | SU77610850 | BEA |        |       |     | 1           | 2     | 42      | -67 | 42     | -62 | 4     |       |       |       |       | DR 4  | IMPEN 25      |

-----MOTTLES----- PED      -----STONES----- STRUCT/ SUBS  
 COL ABUN CONT COL. GLEY >2 >6 LITH TOT CONSIST STR POR IMP SPL CALC

|    |       |      |           |  |  |  |  |  |   |   |    |    |        |    |   |   |  |
|----|-------|------|-----------|--|--|--|--|--|---|---|----|----|--------|----|---|---|--|
| 1  | 0-29  | mzc1 | 10YR32 00 |  |  |  |  |  | 3 | 0 | HR | 6  |        |    |   |   |  |
|    | 29-60 | mzc1 | 10YR43 00 |  |  |  |  |  | 0 | 0 | HR | 10 |        |    | M |   |  |
|    | 60-95 | ch   | 10YR63 00 |  |  |  |  |  | 0 | 0 |    | 0  |        |    | M |   |  |
| 1P | 0-27  | mzc1 | 10YR44 00 |  |  |  |  |  | 7 | 0 | HR | 35 | WDCSAB | FR |   | Y |  |
|    | 27-42 | mzc1 | 10YR54 00 |  |  |  |  |  | 0 | 0 | HR | 45 |        | FR | M |   |  |
|    | 42-90 | mzc1 | 10YR54 00 |  |  |  |  |  | 0 | 0 | HR | 60 |        | FR | M |   |  |
| 2  | 0-29  | mzc1 | 10YR42 00 |  |  |  |  |  | 6 | 0 | HR | 15 |        |    |   |   |  |
|    | 29-38 | mzc1 | 10YR44 00 |  |  |  |  |  | 0 | 0 | HR | 25 |        |    | M |   |  |
| 3  | 0-30  | mzc1 | 10YR43 00 |  |  |  |  |  | 0 | 0 | HR | 9  |        |    |   |   |  |
|    | 30-35 | mzc1 | 10YR56 00 |  |  |  |  |  | 0 | 0 | HR | 12 |        |    | M |   |  |
| 4  | 0-20  | mzc1 | 10YR53 00 |  |  |  |  |  | 0 | 0 | HR | 8  |        |    |   |   |  |
|    | 20-55 | mzc1 | 10YR54 00 |  |  |  |  |  | 0 | 0 | HR | 12 |        |    | M |   |  |
| 5  | 0-35  | mzc1 | 10YR43 00 |  |  |  |  |  | 0 | 0 | HR | 11 |        |    |   |   |  |
| 6  | 0-25  | mzc1 | 10YR32 00 |  |  |  |  |  | 1 | 0 | HR | 3  |        |    |   |   |  |
|    | 25-35 | mzc1 | 10YR32 00 |  |  |  |  |  | 0 | 0 | HR | 25 |        |    | M |   |  |
|    | 35-45 | mc1  | 10YR54 00 |  |  |  |  |  | 0 | 0 | HR | 40 |        |    | M |   |  |
| 7  | 0-25  | mzc1 | 10YR43 00 |  |  |  |  |  | 0 | 0 | HR | 12 |        |    |   |   |  |