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# Stancombe Quarry, Flax Bourton

## AGRICULTURAL LAND CLASSIFICATION & SITE PHYSICAL CHARACTERISTICS REPORT OF SURVEY

Resource Planning Team
**Taunton Statutory Unit**

August 1994

ADAS

# STANCOMBE QUARRY, FLAX BOURTON, AVON

## AGRICULTURAL LAND CLASSIFICATION

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## STANCOMBE QUARRY, FLAX BOURTON, AVON

## AGRICULTURAL LAND CLASSIFICATION SURVEY

## SUMMARY

The survey was carried out by ADAS on behalf of MAFF as part of its statutory role in response to a planning application made to Avon County Council under the Town and Country Planning Act 1990 for disposal of quarry waste. The fieldwork adjacent to the existing Stancombe Quarry was completed in August 1994 at a scale of 1:10,000. Information on climate, soils, geology and from previous Agricultural Land Classification (ALC) surveys was used and is presented in the report. The distribution of grades is shown on the accompanying ALC map and summarised below. Information is correct at this scale but could be misleading if enlarged.

**Distribution of ALC grades: Stancombe Quarry, Flax Bourton**

| Grade | Area (ha) | % of Survey Area | % of Agricultural Land | |
|---|---|---|---|---|
| 2 | 5.3 | 44.6 | 45.3 | |
| 3a | 5.8 | 48.7 | 49.6 | |
| 3b | 0.6 | 5.0 | 5.1 | |
| Woodland | 0.2 | 1.7 | 0.0 | |
| TOTAL | 11.9 | 100.0 | 100.0 | (11.7 ha) |

The majority of the area surveyed is of best and most versatile quality. On the whole the soils are well drained and have medium clay loam and heavy clay loam topsoils. The soils are stony. The main limitation is workability.

## 1. INTRODUCTION

An Agricultural Land Classification (ALC) Survey was carried out in August 1994 at land adjacent to Stancombe Quarry, Flax Bourton on behalf of MAFF as part of its statutory role in the response to an application made to Avon County Council under the Town and Country Planning Act 1990 for the disposal of Quarry Waste. The fieldwork covering 11.9 ha of land was conducted by ADAS at a scale of 1:10,000 with approximately one boring per hectare of agricultural land. A total of 13 auger borings were examined and 2 soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC map of this area (MAFF 1971) shows the site as Grade 3.

The recent survey supersedes this map having been carried out at a more detailed level and using the 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 agricultural use. The grading takes account of the top 120 cm of the soil profile and a full description of the grades used in the ALC system can be found in Appendix 2.

## 2. CLIMATE

The grade of the land is determined by the most limiting factor present. The overall climate is considered first because it can have an overriding influence on restricting land to a lower grade despite other favourable conditions.

Estimates of climatic variables were interpolated from the published agricultural climate dataset (Meteorological Office 1989). The parameters used for assessing overall climate are accumulated temperature, a measure of the relative warmth of a locality, and average annual rainfall, a measure of overall wetness. The results shown in Table 1 indicate there is no overall climatic limitation.

**Table 1: Climatic Interpolations: Stancombe Quarry, Flax Bourton**

| | |
|---|---|
| Grid Reference | ST 505 675 |
| Altitude (m) | 160 |
| Accumulated Temperature (day °) | 1371 |
| Average Annual Rainfall (mm) | 905 |
| Overall Climatic Grade | 1 |
| Field Capacity Days | 200 |
| Moisture deficit (mm): Wheat | 77 |
| Potatoes | 61 |

Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat and potatoes are also shown. These data are used in assessing the soil wetness and droughtiness limitations referred to in later sections.

## 3. RELIEF AND LANDCOVER

The site gently undulates. The start of a dry valley creates sloping land along the eastern margins. The site is at an average altitude of 160m AOD. At the time of survey all the land was in permanent grass except for the northern tip which lies with the wooded area.

## 4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:50,000 scale solid and drift geology map, sheet 265, (Institute of Geological Sciences 1974). This indicates that the site is mostly underlain by Clifton Down limestone except for a small area of Dolomitic conglomerate on the northern edge, and an area of oolitic limestone on the southern boundary of the site.

The soils were mapped by the Soil Survey of England and Wales in 1983 at a reconnaissance scale of 1:250,000. The site was mapped as entirely the Crwbin Association. These soils are described as very shallow and shallow well *drained loamy soils over limestone.*

The soils found during the recent survey were deeper than indicated by the mapped Association. In places deep virtually stoneless soils were found but generally the clay loams over clays were stony. The soils were mainly well drained and well structured.

## 5. AGRICULTURAL LAND CLASSIFICATION

The distribution of ALC grades is shown in Table 2 and on the accompanying ALC map. This information could be misleading if shown at a larger scale.

**Table 2: Distribution of ALC grades: Stancombe Quarry Flax Bourton**

| Grade | Area (ha) | % of Survey Area | % of Agricultural Land | |
|---|---|---|---|---|
| 2 | 5.3 | 44.6 | 45.3 | |
| 3a | 5.8 | 48.7 | 49.6 | |
| 3b | 0.6 | 5.0 | 5.1 | |
| Woodland | 0.2 | 1.7 | 0.0 | |
| TOTAL | 11.9 | 100.0 | 100.0 | (11.7 ha) |

### Grade 2

These soils are well drained and Wetness Class I (see Appendix 3). The topsoil texture is medium clay loam which lies over heavy clay loams and clays. The soils are often reddish in colour. Part of the southern block has deep soils with few stones, but mostly the soils are stony. The stones are soft limestone. These do not impose a significant droughtiness limitation because of the low moisture deficits in the area. The main limitation is from workability.

### Subgrade 3a

These soils are similar to the stony soils described above except the topsoil texture is heavy clay loam. This imposes a more severe workability limitation. The stone content of the soil was measured in a soil profile pit. Low stone contents of 1% and 5% were measured in the upper horizons and 25% in the lower subsoil.

### Subgrade 3b

A small area of subgrade 3b has been mapped. The northern part of this has a slope limitation, whilst in the south a wetness limitation was found. Here the soil was slowly permeable at depth and showed evidence of poor drainage in the form of maganese and gleying. This soil is Wetness Class III, has a heavy clay loam topsoil, and has few stones within the profile.

### Other Land

The northern tip of the proposed link road lies within the woodland and is mapped as woodland.

## 6. SOIL RESOURCES

The areas referred to can be found on the accompanying Soil Resources map.

"Topsoil" is defined as the organic rich surface horizon. The topsoils at the site are clay loams. A broad distinction can be made between medium and heavy clay loam topsoil textures which mirror the ALC Grade 2 map unit (unit 1) and the Subgrade 3a with 3b (unit 2). These distinct topsoils should be handled separately as they are significantly different in terms of workability. Over the whole site the topsoil was found to vary between 25 cm and 30 cm with occasional profiles outside this range. The most common depth was 30 cm. The topsoil has a moderately developed coarse sub angular blocky structure with friable consistence and is generally reddish in colour.

A total topsoil resource of 35100 $m^3$ is available, distributed as shown in Table 3.

**Table 3 - Topsoil Resources**

| Map Unit | Depth (cm) | Area (ha) | Soils | Volume ($m^3$) |
|---|---|---|---|---|
| 1 | 30 | 5.3 | MCL | 15900 |
| 2 | 30 | 6.4 | HCL, HZCL | 19200 |
| | | | | 35100 |

"Subsoil" is defined as the less organic rich lower horizons. Two subsoil horizons are found across the site. These soils are generally reddish in colour. In unit 1 the upper subsoil is a heavy clay loam to an average 60cm with low stone contents. This soil has a moderate structural condition with good porosity. The structure of the soil is moderately developed coarse sub angular blockly with friable consistence and the peds are well rooted.

The lower subsoil in unit 1 is a clay to depth. This generally stonier horizon has a similar structure to the upper horizon but is firm in consistence.

Unit 2 also has two subsoil horizons. Both are clay but the upper horizon has a lower stone content than the lower horizon. The upper clay horizon which extends to an average depth of 60cm has a good structural condition with a moderately developed medium sub angular structure and firm consistence. This horizon has good porosity and many very fine roots. The stone content was measured as 5% by volume in a soil pit. The lower clay subsoil extending to depth is stonier and the stone content was measured as 25% by volume. The horizon has a moderate structural condition with a moderately developed coarse sub angular blockly structure. The consistence of this soil is firm. There are common very fine roots and the porosity of the peds is good.

A maximum subsoil resource of 105300 $m^3$ is available distributed as shown in Table 4.

**Table 4 - Subsoil Resources**

| Map Unit | Depth (cm) | Area (ha) | Soils | Volume ($m^3$) |
|---|---|---|---|---|
| 1 | 30-60 | 5.3 | HCL | 15900 |
| 1 | 60-120 | 5.3 | C | 31800 |
| 2 | 30-60 | 6.4 | C | 19200 |
| 2 | 60-120 | 6.4 | C | 38400 |
| | | | | 105300 |

Resource Planning Team
Taunton Statutory Unit
August 1994

## APPENDIX 1

## REFERENCES

INSTITUTE OF GEOLOGICAL SCIENCES 1974, Solid and Drift Edition, Sheet 264, Bristol

MAFF 1971, Agricultural Land Classification Map, Sheet 155, Provisional 1:63360 scale.

MAFF 1988, Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for grading the quality of agricultural land), Alnwick.

METEOROLOGICAL OFFICE 1989, Climatological Data for Agricultural Land Classification.

SOIL SURVEY OF ENGLAND AND WALES 1983, Sheet 5, Soils of South West England, 1:250000 scale.

## APPENDIX 2

## DESCRIPTION OF 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 include 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 and horticultural crops can usually be grown but on some land in 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. Where 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 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 most 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.

**Descriptions of other land categories used on ALC maps**

**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 park land, 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.

**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 landcover types, eg buildings in large grounds, and where may be shown separately. Otherwise, the most extensive cover type will usually be shown.

**Source:** MAFF (1988) Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Agricultural Land), Alnwick.

## APPENDIX 3

## DEFINITION OF SOIL WETNESS CLASSES

### Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

### Wetness Class 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 not wet within 40 cm depth for more than 30 days in most years.

### Wetness Class 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 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 and 90 days in most years.

### Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

### Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

### Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

**Notes:** The number of days specified is not necessarily a continuous period. 'In most years' is defined as more than 10 out of 20 years.

**Source:** Hodgson, J M (in preparation), Soil Survey Field Handbook (revised edition).

## SOIL RESOURCES: SOIL UNITS

| TEXTURE | DEPTH (CM) | STONES | AREA (ha) | VOLUME ($m^3$) |
|---|---|---|---|---|
| Unit 1 | | | | |
| MCL | 0-30 | <1% | 5.3 | 15900 |
| HCL | 30-60 | 5% | 5.3 | 15900 |
| C | 60-120 | 25% | 5.3 | 31800 |
| Unit 2 | | | | |
| HCL, HZCL | 0-30 | <1% | 6.4 | 19200 |
| C | 30-60 | 5% | 6.4 | 19200 |
| C | 60-120 | 25% | 6.4 | 38400 |
| | | | | 140400 |

**Abbreviations**

| | |
|---|---|
| MCL | Medium Clay Loam |
| HCL | Heavy Clay Loam |
| HZCL | Heavy Silty Clay Loam |
| C | Clay |

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| SITE NAME | PROFILE NO. | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Stancombe Quarry | Pit 1 | 0° | PGR | Av Rainfall: 905 mm<br>ATO: 1371 day °C<br>FC Days: 200<br>Climatic Grade: 1<br>Exposure Grade: 1 | Clifton Down Limestone |
| JOB NO. | DATE | GRID REFERENCE | DESCRIBED BY | | SOIL SAMPLE REFERENCES |
| 95/94 | 11/8/94 | ASP 4 ST 504 676 | GMS | | - |

| Horizon No. | Lowest Av. Depth (cm) | Texture | Matrix (Ped Face) Colours | Stoniness: Size,Type, and Field Method | Mottling Abundance, Contrast, Size and Colour | Mangan Concs | Structure: Ped Development Size and Shape | Consistence | Structural Condition | Pores (Fissures) | Roots: Abundance and Size | Calcium Carbonate Content | Horizon Boundary: Distinctness and form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 18 | HCL | 5YR43 | 1% >2cm vis SLST | N | N | MCSAB | Friable | - | G | MF, MVF | | Clear smooth |
| 2 | 40 | C | 2.5YR34 | 5% >2cm sieved SLST plus some very large | N | N | MMSAB | Firm | G | G | MVF | | Clear smooth |
| 3 | 90+ | C | 2.5YR34 | 25% >2cm sieved SLST although patches with very little | N | N | MCSAB | Firm | M | G | CVF | | |

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 116 mm

Potatoes: 115 mm

Moisture Deficit Wheat: 77 mm

Potatoes: 61 mm

Moisture Balance Wheat: 39 mm

Potatoes: 54 mm

Droughtiness Grade: 1 (Calculated to 90 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks:

Virtually no stone under 2cm in size. Top 25 cm textured as HCL.

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| SITE NAME | PROFILE NO. | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Stancombe Quarry | Pit 2 | 0° | PGR | Av Rainfall: 905 mm<br>ATO: 1371 day °C<br>FC Days: 200<br>Climatic Grade: 1<br>Exposure Grade: 1 | Clifton Down Limestone |
| JOB NO. | DATE | GRID REFERENCE | DESCRIBED BY | | SOIL SAMPLE REFERENCES |
| 95/94 | 11/8/94 | ASP 6 ST 506 676 | GMS | | - |

| Horizon No. | Lowest Av. Depth (cm) | Texture | Matrix (Ped Face) Colours | Stoniness: Size,Type, and Field Method | Mottling Abundance, Contrast, Size and Colour | Mangan Concs | Structure: Ped Development Size and Shape | Consistence | Structural Condition | Pores (Fissures) | Roots: Abundance and Size | Calcium Carbonate Content | Horizon Boundary: Distinctness and form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | HCL | 7.5YR42 | neg vis | N | N | MCSAB | Friable | - | G | CVF | | Clear smooth |
| 2 | 57 | HCL | 7.5YR54 | neg vis | FFFO | C | MCSAB | Friable | M | G | CVF | | Clear smooth |
| 3 | 120 | C | 2.5Y62 | 1% SLST vis | MDFO 10YR66 | N | WCSAB | Firm | P | P | N | Y | |

Profile Gleyed From: 57

Depth to Slowly Permeable Horizon: 57

Wetness Class: III

Wetness Grade: 3b

Available Water Wheat: 137 mm

Potatoes: 114 mm

Moisture Deficit Wheat: 77 mm

Potatoes: 61 mm

Moisture Balance Wheat: 60 mm

Potatoes: 53 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks:

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