EFC 6481

111/94

Stancombe Quarry, Flax Bourton, Avon

AGRICULTURAL LAND CLASSIFICATION & SITE PHYSICAL CHARACTERISTICS

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MAFF

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 and north of a proposed quarry disposal site was completed in September 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	1.7	12.5	15.5	
3a	9.3	68.4	84.5	
Agricultural Buildings	0.5	3.7	0.0	
Non-Agricultural	2.1	15.4	0.0	
TOTAL	13.6	100.0	100.0	(11.0 ha)

All of the area surveyed is of best and most versatile quality. 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 September 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 on land to the south of the present survey. The fieldwork covering 13.6 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 504 678
Altitude (m)		160
Accumulated Temperature (day °)		1371
Average Annual Rainfall (mm)		906
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 site is at an average altitude of 160m AOD. At the time of survey all the land was in permanent grass except for a block of young trees running across the site.

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 underlain by Clifton Down limestone and Dolomitic conglomerate.

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. The soils were stony. The clay loams over clays became stonier towards the quarry. Part of the site had heavy clay loam topsoils whilst the rest had medium clay loam topsoils.

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	1.7	12.5	15.5	
3a	9.3	68.4	84.5	
Agricultural Buildings	0.5	3.7	0.0	
Non-Agricultural	2.1	15.4	0.0	
TOTAL	13.6	100.0	100.0	(11.0 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. The soils are stony. The stones are hard 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 soil profile pits. Higher stone contents were found at this site than to the south during a previous survey. Part of the area mapped as 3a has medium clay loam topsoils but the stone content over 2 cm on the top 25 cm exceeded 10%. This increases wear and tear on machinery and tyres reducing the versatility.

Other Land

An area of agricultural buildings is mapped in the north west corner. A band of young trees across the site has been mapped as non-agricultural land.

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. 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 20 cm and 30 cm with occasional profiles outside this range. The most common depth was 20 cm. The topsoil has a weakly developed fine medium sub angular blocky structure with friable consistence and is generally reddish in colour.

A total topsoil resource of 22,000 m^3 is available, distributed as shown in Table 3.

Table 3 - Topsoil Resources

Map Unit	Depth (cm)	Area (ha)	Soils	Volume (m^3)
A	20	7.7	MCL	15,400
B	20	3.3	HCL, HZCL	66,000
				220,000

"Subsoil" is defined as the less organic rich lower horizons. One subsoil horizon is found across the site. These soils are generally reddish in colour. The subsoil is clay with high stone contents. This soil has a good structural condition with good porosity. The structure of the soil is weakly developed medium sub angular blockly with friable consistence and the peds are well rooted. Two soil profile pits showed the stone content of this subsoil to be around 50%.

A maximum subsoil resource of 110,000 m^3 is available distributed as shown in Table 4.

Table 4 - Subsoil Resources

Map Unit	Depth (cm)	Area (ha)	Soils	Volume (m^3)
A	20-120	7.7	C	77,000
B	20-120	3.3	C	33,000
				110,000

Resource Planning Team
Taunton Statutory Unit
September 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 A				
MCL	0-20	5-12%	7.7	15400
C	20-120	50%	7.7	6600
Unit B				
HCL, HZCL	0-20	5%	7.7	77000
C	20-120	50%	7.7	33000
				132000

Abbreviations

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

[gNL625]

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Stancombe Quarry (2)	Pit 1	0°	PGR	Av Rainfall: 906 mm ATO: 1371 day °C FC Days: 200 Climatic Grade: 1 Exposure Grade: 1	Clifton Down Limestone
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
111/94	21/9/94	ASP 12 ST 505 678	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	HZCL	5YR43	5% >2cm HR (sieved)	none	none	WFSAB	Friable	-	Good	MVF	Calc	Abrupt smooth
2	70+	C	2.5YR46	40% >2cm HR 10% >2mm HR (Sieved)	none	none	WMSAB	Friable	Good	Good	CVF	Calc	

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 83 mm

Potatoes: 90 mm

Moisture Deficit Wheat: 77 mm

Potatoes: 61 mm

Moisture Balance Wheat: 6 mm

Potatoes: 29 mm

Droughtiness Grade: 2 (Calculated to 70 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks:

NL336j

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Stancombe Quarry (2)	Pit 2	0°	PGR	Av Rainfall: 906 mm ATO: 1371 day °C	Clifton Down Limestone
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 200 Climatic Grade: 1 Exposure Grade: 1	SOIL SAMPLE REFERENCES
111/94	21/9/94	ASP1 ST 504 680	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	22	MCL	5YR33	12% >2cm HR (sieved)	none	none	WMSAB	Friable	-	Good	MVF	Calc	Abrupt smooth
2	40+	C	5YR46	40% >2cm HR 10% >2mm HR 50% Total	none	none	WMSAB	Friable	Good	Good	CVF	Calc	

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 2

Available Water	Wheat:	81 mm
	Potatoes:	88 mm
Moisture Deficit	Wheat:	77 mm
	Potatoes:	61 mm
Moisture Balance	Wheat:	4 mm
	Potatoes:	27 mm
Droughtiness Grade:		3A (Calculated to 70 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Top Stones

Remarks:

NL336j

SOIL PLASTICITY RECORDING SHEET

ANNEX 2

SITE DATA

Grid Ref	ST 5068	Site Name	Stancombe Quarry			LPA	Woodspring
AAR	906	ATO	1371	FCD	200	MD (wheat)	77	MD (potatoes)	61

SOIL PIT DATA

	PIT ONE SOIL SERIES Crwbin			PIT TWO SOIL SERIES Crwbin			PIT THREE SOIL SERIES		
DEPTH	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS
10 cm	HCL	N	Ball no worm	MCL	N				
20 cm	C	N	Ball no worm	C	Y				
30 cm	C	Y		C	Y				
40 cm	C	Y			Impenetrable				
50 cm	C	Y							
60 cm	C	Y							

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