8FC S 6895

84/95

Shorncote Quarry, Somerford Keynes Agricultural Land Classification and Site Characteristics

Prepared for MAFF by
H Lloyd-Jones
ADAS Statutory Unit
Bristol

ADAS
FOOD, FARMING, LAND & LEISURE

Ministry of Agriculture, Fisheries and Food
Land Use Planning Unit

MAFF

SHORNCOTE QUARRY, SOMERFORD KEYNES

AGRICULTURAL LAND CLASSIFICATION AND SITE PHYSICAL CHARACTERISTICS

CONTENTS

SHORNCOTE QUARRY, SOMERFORD KEYNES

AGRICULTURAL LAND CLASSIFICATION SURVEY AND SITE PHYSICAL CHARACTERISTICS

SUMMARY

The survey was carried out by ADAS on behalf of MAFF as part of its statutory role in response to an ad hoc planning application made to the Gloucestershire County Council for an extension to Shorncote Quarry. The fieldwork adjacent to the existing quarry was completed in September 1995 at a scale of 1:10,000. Data 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 maps and summarised below. Information is correct at this scale but could be misleading if enlarged.

Distribution of ALC grades: Shorncote Quarry

Grade	Area (ha)	% of Survey Area	% of Agricultural Land (16.3 ha)
3a	16.3	100.0	100.0
TOTAL	16.3	100.0	100.0

All of the site was found to be "best and most versatile". The profiles all have a moderate droughtiness limitation due to the stony subsoils. Over most of the site the topsoil has a medium clay loam texture but in places there is a heavy clay loam topsoil which causes a moderate workability limitation.

1. INTRODUCTION

An Agricultural Land Classification (ALC) Survey was carried out in September 1995 adjacent to Shorncote Quarry, Gloucestershire. The fieldwork covering 16.3 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 17 auger borings were examined and two soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC map of this area (MAFF, 1973) shows the grade of the site at a reconnaissance scale to be Grade 3.

This 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. A 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: Shorncote Quarry

Grid Reference		SU 035 967
Altitude (m)		90
Accumulated Temperature (day °)		1426
Average Annual Rainfall (mm)		750
Overall Climatic Grade		1
Field Capacity Days		172
Moisture deficit (mm):	Wheat	98
	Potatoes	88

3. RELIEF AND LANDCOVER

The site occupies land on the flood plan of the River Churn, to the west of South Cerney, and it is adjacent to the Shorncote Quarry and the Thames Water Shorncote Sewage Treatment Works. The area is virtually flat with an altitude of 90 m above ordnance datum (AOD). At the time of survey all of the fields were used for grazing and the disposal of water from the sewage works.

4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:63,360 scale solid and drift geology map, Sheet 252 (Institute of Geological Sciences, 1974). This shows all of the site to be underlain by First Terrace river terrace deposits of the Recent and Pleistocene Era.

The soils were mapped by the Soil Survey of England and Wales in 1983 at a reconnaissance scale of 1:250,000. This shows the whole site to consist of soils from the Badsey 2 Association.

They are described as being well drained, calcareous fine loamy soils over limestone gravel. Some similar soils may be affected by groundwater.

The soils found during the current survey generally had a thin medium clay loam topsoil over clay upper subsoils and sandy stony lower subsoils. Most of the clays showed evidence of poor drainage. The topsoils and upper subsoils were only slightly stony with between 5% and 10% hard rocks by volume and 5% and 23% hard rocks by volume respectively. The subsoils had much higher stone contents of between 51% and 61% hard rocks by volume.

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: Shorncote Quarry

Grade	Area (ha)	% of Survey Area	% of Agricultural Land (16.3 ha)
3a	16.3	100.0	100.0
TOTAL	16.3	100.0	100.0

SUBGRADE 3a

All of the site is mapped as Subgrade 3a. The profiles typically have a thin medium or heavy clay loam topsoil over a clay upper subsoil and a stony (between 51% and 61% hard rocks by volume) loamy medium sand and medium sand lower subsoils. The soils experience a moderate droughtiness limitation caused by the sandy stony lower subsoil horizons. Due to the thin topsoils in areas there is an overall heavy texture for the top 25 cm of the profile which gives some profiles a moderate workability limitation as well. Although the clay upper subsoils are gleyed the profiles were assessed as Wetness Class I (see Appendix 3) because the profiles are predominantly coarse textured.

6. SOIL RESOURCES

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

"Topsoil" is defined as the rich organic surface horizon. Across the site four different soil map units were identified. Map units I, II and III have a similar medium clay loam topsoil with a relatively low stone contents of between 5% and 10% hard rocks by volume. The structure of this friable topsoil was seen to be weakly developed medium sub-angular blocky. The difference between the three units is the depth of the topsoil horizon which is typically 20 cm for units I and III but only 10 cm for unit II.

The topsoil in map unit IV is a heavy clay loam with a low stone content of 5% hard rocks by volume. The structure of this horizon is weak medium sub-angular blocky with a friable consistence. There are some signs of wetness with few distinct fine ochreous mottles being observed.

Topsoil resources of 12,000 m^3 , 4,100 m^3, 4,200 m^3 and 6,150 m^3 for map units I, II, III and IV respectively are shown in Table 3. The total topsoil resource for the whole site is 26,450 m^3.

"Subsoil" is defined as the less organic lower horizons. The subsoils across the site were found to be relatively uniform with the only major differences between the soil map units being the depths at which the upper subsoils start and end. Map units I, II, III and IV all have the same upper subsoil with typical depths given in Table 3. This comprises of a slightly stony, between 5% and 23% hard rocks by volume, clay or heavy clay loam in places. These two horizons can be considered as one map unit in this instance. They showed evidence of poor drainage and

were assessed as being gleyed due to their pale matrix colours, typically 10YR53 and 10YR64, and common distinct fine ochreous mottling. The structure was seen to be a friable weak medium and moderate coarse sub-angular blocky.

The lower subsoil, which was found across the whole site, consists of a stony medium sand. In places there is a thin layer of stony loamy medium sand above the medium sand but these two horizons can also be considered as one map unit. They have maximum stone contents of between 51% and 61% hard rocks by volume and a typically weak fine granular structure with a very friable consistence.

A total subsoil resources for the whole site is 169,150 m^3, which is shown in Table 3.

Table 3: Soil Resources

Map Unit	Depth (cm)	Area (ha)	Soils	Volume (m^3)
I	0-20	6.0	MCL	12,000
	20-45	6.0	C, HCL	15,000
	45-120	6.0	LMS,MS	45,000
II	0-10	4.1	MCL	4,100
	10-45	4.1	C, HCL	14,350
	45-120	4.1	LMS, MS	30,750
III	0-20	2.1	MCL	4,200
	20-55	2.1	C	7,350
	55-120	2.1	LMS, MS	13,650
IV	0-15	4.1	HCL	6,150
	15-45	4.1	C	12,300
	45-120	4.1	LMS, MS	30,750
			Total Soil Resource	195,600

Resource Planning Team
Taunton Statutory Unit
September 1995

APPENDIX 1

REFERENCES

INSTITUTE OF GEOLOGICAL SCIENCES (1974) Solid and Drift Edition, Sheet 252, Swindon (1:63,360).

MAFF (1973) Agricultural Land Classification Map, Sheet 157, Provisional 1:63,360 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, 1:250,000 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 (e.g. 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 (e.g. 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, e.g. 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 MAP SCHEDULE

Map Unit	Depth (cm)	Area (ha)	Soils	Volume (m^3)
I	0-20	6.0	MCL	12,000
	20-45	6.0	C, HCL	15,000
	45-120	6.0	LMS,MS	45,000
II	0-10	4.1	MCL	4,100
	10-45	4.1	C, HCL	14,350
	45-120	4.1	LMS, MS	30,750
III	0-20	2.1	MCL	4,200
	20-55	2.1	C	7,350
	55-120	2.1	LMS, MS	13,650
IV	0-15	4.1	HCL	6,150
	15-45	4.1	C	12,300
	45-120	4.1	LMS, MS	30,750
			Total Soil Resource	195,600