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Agricultural Land Classification

Reconnaissance Survey

Grove Farm, Bierton, Bucks.

Ministry of Agriculture Fisheries and Food

AGRICULTURAL LAND CLASSIFICATION

RECONNAISSANCE SURVEY

GROVE FARM, BIERTON, BUCKINGHAMSHIRE

1. BACKGROUND

1.1. The 36.9 hectare site lies to the north east of Aylesbury, Buckinghamshire, about 1 km north of Bierton. The site is bounded to the north by a small stream, a tributory of the River Thames. The remaining boundaries were marked by hedgerows.

Surveying was carried out on the 1 November 1990 in connection with a proposed land fill site.

1.2 The site was surveyed using 110cm and 120cm Dutch soil augers, with sampling densities of 1 per 200m on a grid basis across the site. In addition two soil pits were examined to enable more detailed soil descriptions.

Land Use

1.3 At the time of survey, the site was under permanent pasture, grazed by cows.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1. The site varies in altitude from 78-86m AOD. The ground slopes towards the west and north west. Nowhere on the site does gradient or altitude represent a significant limitation to agricultural land quality.

Climate

2.2. The average annual rainfall for this site is between approximately 646-649mm (Met Office 1989), which is low in the national context. The median accumulated temperature above 0°C, between January and June, a measure of the relative warmth of a locality, ranges between 1404-1410 day degrees. The site is at field capacity for around 137 days per annum which provides a measure of the effect of climate on the soil water regime; crop adjusted moisture deficits are within the range 108-109 for wheat and 100-101 for potatoes.

2.3. Climatic factors per se place no limitation on agricultural land quality, but do affect interactive limitations between soil and climate, namely soil wetness and droughtiness.

Geology and Soils

2.4. British Geological Survey Sheet 238 Aylesbury (1972) shows the site to be underlain by Portland Beds in the far south eastern corner, overlying Kimmeridge Clay which outcrops across the remainder of the site.

2.5. Soil Survey of England and Wales, Sheet 238 Aylesbury (1968) shows the site to comprise three soil mapping units. The Bierton Complex is described as "calcareous loamy sands, and fine sandy clays, overlying clays which are gleyed". The Rowsham Complex as "mixed loamy and gravelly drift over clay" and the Denchworth Series as "stoneless wet clayey soils which are strongly mottled; paleo-stagnogleys" (SSEW 1984).

2.6 Field examination of the soils indicates the presence of three soil types across the site.

2.7. Firstly and most extensively are those soils which rest over clay. They can be subdivided into two varients.

2.71. Firstly there are non-calcareous, sandy silt loams to medium/heavy clay loams, with occasional topsoils comprising medium clay loams, overlying medium/heavy clay loams which pass into clay at various depths from about 25cm. Slow permeability of the clay coupled with gleying (between 15-35cm) which indicates poor drainage conditions results in these soils being assigned to wetness Class III and IV.

Occasional profiles were found to be slightly stony (c. 2-5% V/V angular flints) between 28 and 50cm, whereas some profiles became impenetrable (to soil augers) from 80cm due to Portland limestone.

2.72. The second varient is similar to that described above, but with calcareous subsoils. Profiles typically comprise medium/heavy clay loam topsoils overlying clay between 28 and 30cm. An abrupt boundary occurs between 40 and 60cm. Below this the clay contains c. 2-5% small calcareous nodules, with occasional profiles comprising 30-40% calcareous chalk fragments within the clay matrix.

Mottling and gleying occurs between 28 and 40cm indicating poor drainage. These soils are assigned to wetness Class III and IV accordingly.

2.8. The second group of soils occur principally towards the southern half of the site. These soils appears to display characteristics associated with the underlying Portland Beds. Profiles typically comprise calcareous heavy clay loam topsoils, overlying clay which passes into a fine sandy clay loam at about 60cm, where upon the profile becomes impenetrable (to soil augers) due to the presence of Portland limestone.

These soils were mottled and gleyed from 45cm, becoming increasingly calcareous with depth. Such evidence of poor soil drainage results in these profiles being assigned to wetness Class III.

2.9. The third main group of soils occurs towards the northern half of the site, adjacent to the stream. Profiles typically comprise organic silty clay loam topsoils overlying clay at 20cm which is mottled and gleyed. These soils are very poorly drained, and are thus assigned to wetness Class IV.

3. AGRICULTURAL LAND CLASSIFICATION

3.1. The ALC grading of the survey area is primarily determined by interactions between climate and soil factors, namely wetness and droughtiness.

ALC grades 3a and 3b have been mapped and the breakdown of these grades in terms of area and extent is given below.

Grade	ha	% of total agricultural land
3a	7.6	21
3b	29.3	79
Total Agricultural Area	36.9	

3.2. Appendix 1 gives a general description of the sub-grades identified in this survey.

3.3. Grade 3a

Land of this quality represents 21% (7.6 ha) of the total agricultural land, and occurs in two locations, namely towards the north west and as a strip, commencing in the south eastern corner, extending north eastward.

Profiles typically comprise sandy silt loam or medium/heavy clay loam topsoils, overlying medium/heavy clay loam subsoils, which pass into clay in the lower subsoil between 35 and 45cm.

All profiles exhibit strong evidence of gleying (usually between 15 and 35 cm), and are typically slowly permeable within 35cm. In addition, towards the south eastern corner of the site profiles tend to be calcareous, becoming impenetrable (to soil augers) at about 60cm due to the presence of Portland limestone.

These soils are assigned to wetness Class III and IV with wetness and workability restrictions forming an overriding limitation to agricultural use.

3.4. Grade 3b

Land of this quality occupies 79% (29.3 ha) of the total agricultural land on the site, and occurs in two situations.

Land graded 3b adjacent to the stream, typically comprises organic silty loam topsoils, overlying clay at 20cm which is strongly mottled and gleyed.

The remainder of the land graded 3b, comprises medium/heavy clay loam topsoils, with occasional profiles comprising silt loams and medium silty clay loams. These overlie similar textures or medium clay in the upper subsoil which pass into clay at various depths within 40cm.

All profiles exhibit evidence of gleying (usually within 15cm of the surface), and are typically slowly permeable within 25 cm. These soils are assigned to wetness class III and IV with wetness being the overriding limitation (although such profiles are also limited by droughtiness albeit to a lesser extent). The agricultural potential of these soils is thereby restricted and they are assigned to this grade accordingly.

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SOURCES OF REFERENCE

BRITISH GEOLOGICAL SURVEY (1972), Sheet 238, Aylesbury, 1:50000

MAFF (1988), Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.

METEOROLOGICAL OFFICE (1989), Climatological datasets for agricultural land classification.

SOIL SURVEY OF ENGLAND AND WALES (1968), Sheet 238 Aylesbury, 1:63600

SOIL SURVEY OF ENGLAND AND WALES (1984), Soils and their use in South East England, Bulletin 15.

APPENDIX I

DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

Descriptions are also given of other land categories which may be used on ALC maps.

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 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 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.

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: golf courses, 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. 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 land cover types, eg buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will usually 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 revised soil wetness classes (Hodgson, in preparation) are identified and are defined in Table 11.

Table 11 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 not wet within 40 cm depth for more than 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 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.
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.
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.

[1] The number of days specified is not necessarily a continuous period.

[2] 'In most years' is defined as more than 10 out of 20 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.