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AGRICULTURAL LAND CLASSIFICATION

WOOLHAMPTON QUARRY, BERKSHIRE

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1. BACKGROUND

1.1 The 21.2 ha site lies between the River Kennet and River Enbourne at Woolhampton in Berkshire, just south of Midgham Station and immediately north of current sand and gravel workings. The site was inspected on the 22 and 23 of August 1990, in connection with proposals for an extension to the current gravel workings with subsequent restoration to conservation lakes.

1.2 The site was surveyed using 110 and 120 cm Dutch soil augers, with samples being taken at approximately 100 m intervals. In addition three soil inspection pits were examined.

Land Use

1.3 At the time of survey most of the site was under cereal stubble, with a smaller area to the north and west of the central copse being under permanent grassland.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1 The site lies between 56 and 59 m A.O.D. A band of slightly higher land lies along the southern and eastern boundary of the site with central and north western areas being slightly lower. Gradient is not a limitation in terms of land quality at this locality. However, in the field to the north of the copse, moderate undulations, possibly caused by disturbance may act to impose a micro-relief limitation.

Climate

2.2 The average annual rainfall for this site is 696 mm (Met. Office, 1989), this being relatively dry in national terms. The median accumulated temperature above 0°C between January and June, a measure of the relative warmth of the locality, is 1463 day degrees, (Met. Office, 1989). The site has approximately 149 field capacity days, which provides a measure of the effect of climate on the soil water regime. Crop adjusted moisture deficits are 110 mm for wheat and 103 mm for potatoes. The site is unlikely to be especially frost prone or exposed.

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 Geological Survey of England and Wales, (1946), Sheet 268, Reading, shows the south eastern half of the site to be underlain by valley gravels and the north western part by alluvium.

2.5 The Institute of Geological Science (1976) Minerals Assessment report No. 24, Aldermaston, Berkshire, confirm the above geological information.

2.6 Soil Survey of England and Wales (1967), Sheet 268, Reading, shows most of the site to comprise the Colthrop series. These soils are characterised by a pale loamy topsoil, directly overlying pale algal marl, sometimes interlayered with peat, (Jarvis, R.A. (1968), Soils of the Reading District). Jarvis (1968), states that, 'on relatively high ground the soil is well drained and unmottled to about 20 inches of the ground surface. In depressions, the marl may overlie layers of peat and/or peaty marl, and the soil is locally imperfectly drained due to seasonally rising groundwater. Approaching the mapped boundaries, the algal marl may overlie fluvial gravel, as at Woolhampton gravel pit, but more commonly, layers of peat separate it from the gravel'.

2.7 Detailed field examination of the site broadly confirms this and indicates that there are two soil types present.

2.8 Firstly, and most extensively, are those soils developed in algal marl. These comprise extremely calcareous clay loams, typically resting over peat and/or gravel at variable depths and commonly affected by fluctuating groundwater levels.

2.9 Secondly, a limited area of peaty soils was found, comprising calcareous peaty loam topsoils over peaty loam and mineral subsoils. This soil type is found in a small area to the north of the copse.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The ALC grading of the survey area is determined by interactions between climatic and soil factors, namely wetness and droughtiness. In addition, chemical factors, (namely high pH in most of the soils), have a significant effect on land quality at this locality, and across the area to the north of the copse, the land has been graded on the basis of micro-relief factors. ALC grades 2, 3a and 3b have been mapped and a breakdown of these grades in terms of area and extent is given below:

Grade	Area (ha)	% of total agricultural land
2	14.20	78.0
3a	2.40	13.2
3b	1.60	8.8
Total agricultural area	18.20	100
Woodland)	3.0	
Non-agricultural)		
Total area of site	21.20	

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

3.3 Grade 2

Land of this quality occurs across much of the area surveyed and principally comprises soils as described in section 2.8, namely deep, extremely calcareous clay loams with variable topsoil stone contents, (ie. c. 1-5% v/v flints). Most profiles contain horizons of organic material, (typically peaty loam or peat) and of pure algal marl, but these are very variable both in extent and depth below the surface. All these soils have very high levels of calcium carbonate in both the topsoil and subsoil, typically ranging from about 30 to 80%. Such high levels act to restrict micronutrient availability to plants. It is therefore judged that these soils, which have developed from algal marl, have sufficiently high carbonate contents to impose a slight chemical limitation thereby restricting the agricultural land quality. Generally, most soils inspected were well drained and placed in wetness class I. However, a few profiles showed evidence of slightly imperfect drainage in the form of gleying at variable depths, these being assigned to wetness class II accordingly. In addition, occasional profiles were shallow over sand and gravel at depths greater than 80 cm, this causing them to possess a slight droughtiness limitation.
Overall, however, the principal limitation to this land and the reason for assigning it to grade 2, is the chemical restriction resulting from the very high levels of calcium carbonate identified.

3.4 Grade 3a

Land of this quality occurs as two mapping units; firstly, an area along the south eastern boundary, marked by a slightly higher band of stony soil, and secondly, an area towards the north east of the site. Both these units comprise those soils described at section 2.8, and are therefore subject to the slight chemical limitation which affects most of the site.

The overriding limitation to the agricultural potential of these areas however is droughtiness. The southerly area is also restricted by slightly stony topsoils.
The presence of impenetrable (to soil auger) gravel at depths of about 55-60 cm causes the profiles in both units to be droughty thereby restricting the agricultural land quality to a maximum of grade 3a. In the southerly mapping unit, approximately 11% v/v flints >2 cm in the topsoil causes a moderate workability/ cultivation restriction.

3.5 Grade 3b

Land of this quality occurs as one mapping unit towards the north of the site. Profiles typically comprise peaty loam topsoils over similar textures or organic clay loams in the subsoil. Soil drainage is poor across this area as evidenced by prominent gleying in the subsoil and local information which suggests that the area tends to lie under water during the winter months. Profiles are thus assigned to wetness class IV.
In addition abrupt changes in landform across the area, which may be the result of disturbance, act to impose a micro-relief limitation at this locality.

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SOURCES OF REFERENCE

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

SOIL SURVEY OF ENGLAND AND WALES (1967) Sheet 268, Reading.

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APPENDIX 1

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.

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.