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AGRICULTURAL LAND CLASSIFICATION

Berkshire Minerals Plan,
Sites 2A and 2B,
Colthrop, Berkshire,

Ministry of
Agriculture
Fisheries
and Food

PR

AGRICULTURAL LAND CLASSIFICATION
BERKSHIRE MINERALS PLAN
SITE 2A AND 2B, COLTHROP, BERKSHIRE

1. BACKGROUND

1.1 The 160.1 hectare site lies to the east of Newbury and directly south of Thatcham Station. The area is bounded to the north partially by railway lines, sewage works and a drainage ditch. The western boundary is marked by a minor road. The southern and eastern boundaries are not marked by any obvious physical features. The River Kennet flows through the middle of the site.

1.2 The site was surveyed in May 1991 using 120 cm Dutch soil augers with samples being taken at approximately 100 m intervals across the site. In addition three soil pits were examined to enable more detailed soil descriptions.

1.3 Land Use

At the time of survey most of the site was under permanent pasture, except for a small area towards the east and north east that was under oilseed rape and wheat.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1 The altitude of the site varies between approximately 65-70 m A.O.D. with the highest land occurring towards the south of the site, falling gently towards the River Kennet. Correspondence with the National Rivers Authority (Thames Region) suggests that the land is not at risk from flooding.

Climate

2.2 Estimates of climatic variables were obtained by interpolation from a 5 km grid database (Met. Office, 1989) for a representative location in the survey area.

Climatic Interpolation

Grid Reference	SU 53862	SU 534655
Altitude (m A.O.D.)	65	70
Accumulated temperature (°day Jan-June)	1456	1461
Annual average rainfall (mm)	705	701
Field Capacity Days	152	151
Moisture Deficit wheat (mm)	108	109
Moisture Deficit potatoes (mm)	101	102

2.3 The important parameters in assessing an overall climatic limitation are average annual rainfall (a measure of overall wetness), and accumulated temperature (a measure of the relative warmth of a locality). Although average annual rainfall is relatively low in a national context, there is no overall climatic limitation affecting the land quality of this site. However climatic factors do affect the interactive limitations between soil and climate namely, soil wetness and droughtiness.

Geology and Soils

2.4 British Geological Survey Sheet 267, Newbury, (1971), shows the site to be underlain by Alluvium over River Terrace Gravels.

2.5 The Soil Survey of England and Wales, Sheet 6 (1983) shows the site to comprise soils of the Frome Association. In the Kennet Valley fine textured deposits rest over flint and/or chalky gravel; calcareous marl and peaty bands occur locally. These soils are described as "calcareous alluvial gley soils" (SSEW 1984). They are grey and mottled silty clay loams affected by high groundwater with calcareous flints and/or chalky gravels at relatively shallow depths.

2.6 Detailed field examination of the soil indicates that there are three soil types present at this site.

2.7 The soil group which extends across most of the site typically comprises very calcareous topsoils of silt loam, fine sandy silt loam or medium silty clay loam. Occasional organic silt loam topsoils were present. These overlie similar textures, or heavy silty clay loam which contain between about 2-50% fine algal marl fragments (which are composed of very small shells). The upper subsoil rests over algal marl (whose composition varies from very gritty coarse textured marl containing many large shell fragments, to more finely textured marl). This horizon may become interbedded with peaty loams and/or loamy peats, with occasional profiles becoming impenetrable (to soil auger) due to gravelly horizons between about 80-110 cm.

2.8 The second group of soils were found to occur towards the north of the site. Profiles typically comprise calcareous fine sandy silt loam, silt loam and medium silty clay loam, overlying similar textures with about 2-15% algal marl fragments within the soil matrix. These overlie lower subsoils of medium or heavy silty clay loam, medium clay loam or sandy clay loam, becoming impenetrable (to soil auger) due to gravelly horizons between about 60-90 cm.

Occasional profiles were found to comprise calcareous fine sandy silt loam topsoils, over sandy loam, medium or heavy silt clay loam and medium clay loam becoming impenetrable (to soil auger) due to gravelly horizons between 22 and 60 cm.

2.9 The third group of soils are very localised. They occur towards the south of the site. Profiles typically comprise non calcareous to slightly calcareous medium or heavy silty clay loam and medium or heavy clay loam topsoils over subsoils of heavy clay loam, overlying slowly permeable clay and silty clay between 28 and 65 cm. All profiles exhibit gleyic features within 65 cm.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The ALC grading of this site is primarily determined by interactions between soil and climatic factors, namely soil wetness

and droughtiness. Areas limited by steep gradients and topsoil stones were also found. In addition to these factors, there is also a chemical limitation which restricts agricultural land quality across the site. This was confirmed through laboratory analysis of soil samples, indicating high pH, caused by high calcium carbonate levels in the soil. ALC grade 2, 3a and 3b have been mapped at this site and a breakdown of the grades in terms of area and extent is given.

Grade	Area ha	% of total agricultural land
2	131.0	89
3a	13.5	9
3b	2.3	2
Total Agricultural Area	146.8	
Agricultural Buildings	1.0	
Woodland	2.2	
Non Agricultural	10.1	
Total Area of the site	160.1	

3.2 Appendix 1 gives a generalised description of the grade and subgrades identified in this survey.

Grade 2

3.3 Land of this quality occurs across the majority of the site, and comprises soils similar to those described in section 2.7.

Deep, extremely calcareous profiles were identified comprising silt loam, fine sandy silt loam, and medium silty clay loam topsoils, with occasional topsoils having relatively high organic matter contents, thereby being termed organic. Subsoils were variable, but most profiles contained fine to coarse textured fragments of algal marl within the soil matrix, overlying bands of algal marl, over peaty loam or loamy peat, or were found to comprise interbedded layers of algal marl and peaty loam whose extent and depth varies considerably across the site.

Occasional profiles were found to comprise organic silt loam topsoils, over similar textures or heavy silty clay loam with about 2-50% fine algal marl fragments held within the soil matrix, overlying subsoils of sandy silt loam or medium to heavy silty clay loam. All profiles were found to be gleyed at variable depths thus indicating drainage imperfections, as a result of groundwater movement. Wetness class I and II were assigned accordingly.

All these soils having developed from calcareous algal marl deposits have very high levels of calcium carbonate in both the topsoil and subsoil, typically ranging from about 32-56% (as assessed by laboratory analysis). Such high levels act to restrict micro nutrient availability to plants. It is therefore judged that these soils have sufficiently high carbonate contents, to impose a slight chemical limitation to plant growth, thereby reducing the flexibility of cropping. High value horticultural crops such as fruit trees are not ideally suited to these conditions. In addition there is a slight wetness limitation resulting from groundwater movements within the soil profiles. Land is therefore assigned to grade 2.

Grade 3a

3.4 Land of this quality occurs towards the north east and north west of the site. Profiles comprise calcareous sandy silt loam, organic silt loam or medium silty clay loam topsoils. These overlie calcareous to non calcareous medium clay loam, medium silty clay loam, sandy loam or coarse sandy subsoils which become impenetrable (to soil auger) due to gravelly horizons between about 22 and 60 cm.

Occasional topsoils are limited by topsoil stone content, this being about 14% v/v angular flints >2 cm. Profiles typically comprise sandy loam topsoils over similar texture or loamy sand becoming calcareous with depth. Drainage imperfections were evident from about 50 cm as a result of ground water movement. Lower subsoils were found to comprise interdigitising layers of peat and algal marl at variable depth.

Land within this grade was found to comprise localised areas that were limited by topsoil stones. Surface stones act as an impediment to cultivation, harvesting and crop growth. In addition, the moderate to extreme stoniness of the soil profile imparts a droughtiness limitation thereby reducing reserves of available water, for plant growth. A combination of both limitations may effect the type of cultivation or the level of yields. However the land is capable of consistently producing moderate to high yields of a narrow range of arable crops, or moderate yields of a wide range of crops.

Grade 3b

3.5 Land of this quality occurs towards the south of the site, and occurs in two situations.

The area towards the south west typically comprises medium silty clay loam topsoils over slowly permeable clay or silty clay. All profiles exhibit gleyic features between about 22 and 30 cm, and are typically slowly permeable within 30 cm of the surface. Drainage imperfections caused by slowly permeable clay horizons result in the allocation of these profiles to wetness class IV. The major limitation is that of wetness and workability.

The additional area of grade 3b towards the south east typically comprises slightly calcareous medium or heavy clay loam topsoils overlying similar textures or heavy silty clay loam. Subsoils overlie slowly permeable clay within 65 cm. Profiles were found to be gleyed between about 60 and 65 cm. Slight drainage imperfections result in the allocation of these profiles to wetness class II. The land is also slightly limited in terms of wetness and workability restrictions. However the major limitation to this land is gradient. Areas with gradients between 8° and 9° were measured using an optial reading clinometer. Limitations due to slopes have a significant effect on the flexibility and safety of mechanised farm operations. It is therefore judged that land can not be graded higher than grade 3b.

SOURCE OF REFERENCE

BRITISH GEOLOGICAL SURVEY (1971) Sheet 267 Newbury.

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 (1983) Sheet 6, Soils of South East England.

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

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.

APPENDIX 2

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.