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AGRICULTURAL LAND CLASSIFICATION

LAND AT FONTWELL, WEST SUSSEX
SURVEYED ON BEHALF OF THE
DUNHILL MEDICAL TRUST

ADAS

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LAND AT FONTWELL, WEST SUSSEX

1. BACKGROUND

1.1. A detailed Agricultural Land Classification (ALC) Survey of 16.8 ha of land at Fontwell, West Sussex, was undertaken on 13 and 14 August 1990. The survey was commissioned by The Dunhill Medical Trust, c/o Meadow Farm, Southbrook Road, West Ashling, West Sussex, P018 8DN.

1.2. The Agricultural Land Classification system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops which can be grown, the level of yield, the consistency of yield and the cost of obtaining it. The classification system gives considerable weight to flexibility of cropping, whether actual or potential, but the ability of some land to produce consistently high yields of a somewhat narrower range of crops is also taken into account.

1.3. The principal physical factors influencing agricultural production are climate, site and soil. These factors together with interactions between them form the basis for classifying land into one of five grades; Grade 1 land being of excellent quality and Grade 5 land of very poor quality. Grade 3 which constitutes about half of the agricultural land in England and Wales, is now divided into two subgrades designated 3a and 3b. General descriptions of the grades and subgrades are given in Appendix 1.

1.4. Further details of the Agricultural Land Classification System are contained in the MAFF publication "Agricultural Land Classification of England and Wales - Revised Guidelines and Criteria for Grading the Quality of Agricultural Land" (MAFF, 1988).

1.5. In connection with the detailed ALC Survey work at Fontwell, 16 auger boring examinations and small topsoil pits were made at approximately 100 m intervals across the site. Additional soil data was obtained from 4 soil inspection pits dug to depths of 1.0-1.2 m, at representative locations on the site.

1.6. At the time of survey the land was in permanent pasture and divided into a number of enclosures being grazed by cattle, sheep and horses.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1. The site lies at altitudes of between 20 and 30 m above ordnance datum (A.O.D) and has gentle falls away from a high point of approximately 30 m A.O.D along the central part of the northern boundary. Gradients are gentle over the site and are not a limitation in terms of agricultural land quality.

Climate

2.2. Interpolation of climatic variables to obtain site estimates from surrounding grid point data (Met. Office, 1989) gives the following data for a representative location in the survey area:

Site Altitude (m)	25 m
Accumulated Temperature (day °C)	1519
Average Annual Rainfall (mm)	799
Field Capacity Days	164
Moisture deficit - wheat (mm)	114
- potatoes (mm)	109

2.3. The important parameters in assessing an overall climatic limitation are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of wetness). In overall climatic terms the above data for the site

indicates no limitation on land quality with the area being one of relative warmth and moderate dryness in a national context. However, interactions between climate and soil factors, namely wetness and droughtiness are an important consideration.

Geology and Soils

2.4. The site lies on a portion of the West Sussex coastal plain which lies between the South Downs and the sea. This plain comprises two raised beach levels of Quaternary age (0-2 million years ago) (I.G.S., 1983). The site is believed to lie on the upper (older) beach level which occurs at approximately 20-45 A.O.D and is cut into the dip-slope of the Chalk of the South Downs (I.G.S, 1983). The published geological map (I.G.S., 1957) indicates valley gravel deposites over the whole site; in more recent publications (I.G.S., 1983) these are termed head gravels, which are described as angular flint gravel with a dominantly clayey matrix

2.5. The soils of South Eastern England have been mapped at a scale of 1:250,000 by the Soil Survey of England and Wales (1983). This maps the Charity 1 Soil Association in the vicinity of the site. The legend accompanying the above map describes these as "well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow soils over flint gravel".

2.6. A more detailed description of the soils of the West Sussex Coastal Plain is contained in Soil Survey of Great Britain Bulletin No 3 (Hodgson, 1967). The accompanying maps again indicate the presence of the Charity Soil Series, which is described as a well drained soil developed in flinty silty head deposits. The soil series is divided into two phases based on stoniness.

2.7. Detailed examination of the soils on the site confirms the broad descriptions given above. Topsoils are typically moderately to very stony (15-45% v/v >2mm size), dark grey brown, dark brown and dark yellowish brown, silt loams, fine sandy silt loams, or medium

silty clay loams. These overlie similar or increasingly flinty dark brown to yellowish brown upper subsoils which pass at varying depth to flint gravel in a strong brown silty clay loam or clay matrix. These soils are well drained (wetness Class I) but are limited by a high stone content in the topsoil and throughout the soil profile. This impedes cultivations, harvesting, and crop growth and causes a reduction in the available water capacity and nutrient reserves of the soil. The reduced available water capacity in combination with moderately high crop adjusted moisture deficits (see para 2.2) causes these soils to be significantly drought-prone.

3. AGRICULTURAL LAND CLASSIFICATION

3.1. Land quality on this site is primarily determined by soil stone content, and detailed inspection of the site indicates that a grading of 3b and 3a is appropriate. A breakdown of the grades, as mapped on the accompanying coloured plan, is given below in terms of area and relative extent:

Grade	Ha	%
3a	3.32	21
3b	12.86	79
	16.18	100

GRADE 3

Sub-Grade 3a

3.2. Land mapped as Grade 3a corresponds to an area of less stony soils towards the central/western part of the site. Topsoils comprise silt loams and medium silty clay loams overlying similar textured upper subsoils. These pass with depth into a gravel substratum in a strong brown coloured clayey matrix.

3.3. Topsoil stone content was estimated (by riddle) to be between 10-12 % v/v of flints in the 2-6 cm size range, with a further

5-12% of flints less than 2 cm size. In terms of the ALC criteria for topsoil stone content this restricts such land to a maximum grading of 3a (MAFF, 1988). This is because a stony topsoil can increase production costs by causing extra wear and tear to implements and tyres. Crop quality may also be reduced by, for example, the distortion of root crops or the bruising of potatoes during harvesting. Stones can also impair crop establishment and reduce the nutrient capacity of soil.

3.4. A moderately high stone content throughout the whole of the soil profile also has the effect of reducing the amount of moisture in the soil available for crop growth. Consequently droughtiness is also an important limitation to land quality. Calculation of soil moisture balances for two reference crops (wheat and potatoes) also indicates a maximum grading of 3a using the published ALC criteria (MAFF, 1988). The likely agronomic effect is to produce lower and/or less consistent yields.

Grade 3b

3.5. Grade 3b land occurs over the majority of the site where the major limitation to agricultural use is one of high topsoil stone content. In addition, at most locations, droughtiness assessment using soil moisture balance calculations, also indicates a maximum potential grading of 3b.

3.6. Soils are very similar to those described for Grade 3a but have a higher stone content, both within the topsoil and upper subsoil. The lower gravelly substratum is similar in both cases.

3.7. Topsoil stone content comprises 15-25% v/v (estimated by riddle) of flints 2-6 cm in size, together with an additional 15-20% of smaller flints less than 2 cm in size, giving an overall total topsoil stone content of 30-45% v/v. Subsoil stone content is similar or higher, reaching an estimated maximum of 75-80% v/v at depth.

3.8. The effect of higher stone content is to increase production costs as outlined in paragraph 3.3 and due to the further decrease in available water capacity the risk of drought is increased, thereby further reducing the yield potential and its consistency from year to year.

Resource Planning Group
ADAS, Reading

August 1990

SOURCES OF REFERENCE

HODGSON. J.M., (1967) Soils of the West Sussex Coastal Plain. Soil Survey of Great Britain Bulletin No.3.

INSTITUTE OF GEOLOGICAL SCIENCES (1957) 1:63360 Scale Drift Edition Geological Map Sheet No. 317 (Chichester).

INSTITUTE OF GEOLOGICAL SCIENCES (1983). The Sand and Gravel Resources of the Country around Chichester and North of Bognor Regis, Sussex. (SU 80,90). Mineral Assessment Report 138.

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) Soils of England and Wales, Sheet 6 (1:250,000 Scale) South East England.

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.