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HATCHES FARM, GREAT KINGSHILL, BUCKINGHAMSHIRE.

STATEMENT OF PHYSICAL CHARACTERISTICS.

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HATCHES FARM, GREAT KINGSHILL, BUCKS

1. BACKGROUND

1.1 The site lies to the east of Great Kingshill and to the north of High Wycombe in Buckinghamshire and covers approximately 0.27 ha. It is bounded to the north and east by field boundaries, whilst the remaining boundaries are not marked by any obvious physical feature. The site was assessed on 1st February 1990 in connection with an application for mineral extraction.

1.2 The site was surveyed using 110 cm and 120 cm Dutch soil augers, with samples being taken at approximately 30-50 m intervals across the site. In addition two soil inspection pits were examined.

Land-use

1.3 At the time of survey the site was covered by maize stubble.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1 The site lies on top of a rise at approximately 175 m A.O.D. and falls very gently westwards.
Gradient is not a significant limitation in terms of land quality at this locality.

Climate

2.2 The average annual rainfall for this area is approximately 790 mm, (Met Office, 1989) this being moderate in a national context. The median accumulated temperature above 0°C between January and June, a measure of the relative warmth of a locality, is expected to be 1309 day degrees, (Met Office, 1989); this is relatively low for the south-east of England. The site has approximately

170 field capacity days, which provides a measure of the effect of climate on the soil water regime. Crop adjusted moisture deficits are 89 mm for wheat and 76 mm for potatoes. The site is thought to be slightly exposed.

2.3 Climatic factors, specifically moderate average annual rainfall and relatively low median accumulated temperature, combine to place a slight limitation on agricultural land quality, imposing a maximum of grade 2 at this locality. However, interactive limitations between soil and climate, namely soil droughtiness and, particularly, wetness, have a more significant effect on the agricultural land quality of the site.

Geology and Soils

2.4 British Geological Survey, Sheet 255, Beaconsfield, (1948), shows the site to comprise Clay-with-Flints overlying Upper Chalk.

2.5 Soil Survey of England and Wales, Sheet 6, Soils of South-east England, (1983) shows the site to comprise stagnogleyic paleo-argillic brown earths of the Batcombe association. These soils are described as typically variably flinty, fine silty and fine loamy over clay with seasonal waterlogging. (SSEW, 1983).

2.6 Detailed field examination of the soils broadly confirms this with one soil type being identified.

2.7 Profiles typically comprise moderately stony, (ie, 8-12% v/v of medium angular flints), brownish medium silty clay loam topsoils*, overlying similar textures or heavy silty clay loam or silty clay in the upper subsoil and passing to reddish medium or heavy clay lower down the profile, (ie, between 30 and 65 cm depth). The subsoil is typically stony to very stony, containing between about 10 and 30% v/v of medium angular flints. Profiles show evidence of drainage imperfections, commonly being mottled and gleyed below about 30-50 cm as a result of slowly permeable clay horizons in the subsoil at variable depth, but typically within 55 cm from the surface. The soils are therefore appropriately assigned to wetness class III or IV.

The soils typically become impenetrable, (to soil auger), at depths greater than 80 cm, due to the presence of flints.

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. The stone content of the topsoils is also a factor in determining the land quality. ALC grades 3a and 3b have been mapped and a breakdown of these grades in term of area and extent is given below:

Grade	ha	% of total agricultural land
3a	0.193	72
3b	0.072	27
Total area	0.265	

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

3.3 Grade 3a

Land of this quality occurs across the majority of the total agricultural land area, covering approximately 73%, (0.193 ha) of the site.

Profiles typically comprise medium silty clay loam topsoils* which are moderately stony, (ie, 8-12% v/v of medium angular flints), overlying similar textures or heavy silty clay loam, and passing to silty clay or clay below about 40 cm depth. In occasional profiles the topsoils directly overlie silty clay or clay in the upper subsoil. The subsoils are variably stony, commonly containing between 5 and 30% v/v of medium angular flints. All profiles exhibit evidence of gleying between 40 and 50 cm depth and are slowly permeable, (due to clay textures and poor structure), at depths between 30 and 55 cm; these soils are

therefore appropriately assigned to wetness class III. The poor drainage status of the soils is the primary limitation to agricultural use. However, occasional profiles are also limited by topsoil stone contents of between 10 and 12% v/v of medium angular flints.

3.4 Grade 3b

Land of this quality covers approximately 27%, (0.072 ha) of the total agricultural land area, occurring towards the north eastern corner of the site.

Profiles typically comprise moderately stony, (c. 10% v/v of medium angular flints), medium silty clay loam topsoils* overlying similar textures or medium clay and passing to silty clay or clay below 40 cm depth. These subsoils are variably stony, containing between 10 and 30% v/v of medium angular flints.

Profiles show evidence of imperfect drainage in the form of gleying directly below the topsoil at about 30 cm depth and are slowly permeable between 30 and 40 cm depth. The soils are therefore appropriately assigned to wetness class IV.

The moderate stoniness, (ie, c. 10% v/v of medium angular flints), of the topsoils places a slight limitation on their agricultural potential, causing cultivation and workability problems, but overall drainage imperfections are the most significant limitation to land of this quality, reducing flexibility of cultivations and cropping.

4. SOIL RESOURCES

Soil Units: Consideration for Restoration

4.1 The description of soil units given below provides an indication of the pattern of soil resources on the site. It should be emphasized that this information should not be viewed in the context of soil stripping, but is merely an illustration of the soil resources available for restoration on the site. When considering these details it is important to remember that soils were only sampled to a depth of 80-110 cm during survey work, due to the presence of impenetrable flints. In most cases soils resources will extend below this depth.

Topsoil

4.2 One topsoil unit was identified across the site.* This typically comprises 30 cm, (a range of 27 - 35 m), of very dark greyish brown, (10 yr 3/2), moderately stony, (c.8-12% v/v of medium angular flints), medium silty clay loam.

Subsoil

4.3 One subsoil unit was identified. It is typically composed of between 50 and 80 cm, (minimum extent) of medium or heavy silty clay loam, silty clay or clay. The upper subsoil, (ie, between about 30 and 55 cm depth), is commonly dark brown, dark yellowish brown o yellowish brown, (10YR 4/3, 10YR 4/4 and 10YR 5/4), passing to yellowish red, red or strong brown, (5YR 5/6, 5YR 5/8, 2.5YR 4/8 and 7.5YR 5/6), in the lower subsoil.
Distinct pale and red mottling together with gleying, indicating drainage imperfections, are common between 30 and 50 cm depth and the soils are typically slowly permeable at variable depth between about 30 and 55 cm from the surface. The drainage imperfections cause these soils to be assigned to wetness class III or IV. These subsoils are variable stony, containing between 5 and 30% v/v of medium angular flints. Most profiles become impenetrable, (to soil auger), due to the presence of flints at depths ranging between 80 and 110 cm.

The upper subsoils, where of silty clay loam, texture have a moderately good structure, being composed of moderately well developed medium to coarse sub-angular blocky peds of friable consistence and having greater than 0.5% biopores. However, the lower subsoils, of silty clay or clay texture, have poor structures being weakly developed medium to coarse sub-angular blocky, tending to medium prismatic, peds of firm consistence and with less than 0.5% biopores.

* It should be noted that approximately half the area of the site had been stripped of topsoil at the time of survey. For the purposes of soil description and grading the land it was therefore assumed that the topsoil properties for this area were the same as those for the area where the soil had not been removed.

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SOURCES OF REFERENCE

BRITISH GEOLOGICAL SURVEY, (1948). Sheet 255, Beaconsfield.

HODGSON, J.M., CATT, J.A, & WEIR, A.H., (1967). The Origin and Development of Clay-with-flints and associated Soil Horizons on the South Downs, Journal of Soil Science, Vol. 18, No. 1.

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), Bulletin 15 - Soils and their use in South-East England.

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.