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STATEMENT OF PHYSICAL CHARACTERISTICS

LAND AT RYARSH, KENT

MAFF Ministry of Agriculture Fisheries and Food

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1 BACKGROUND

1 1 16 18 ha of land was inspected on 14 and 15 February 1990 in connection with proposals to excavate sand

1 2 19 auger borings were made using 1 1 m and 1 2 m Dutch soil augers at approximately 100 m intervals across the site Further soil data was obtained from three soil pits and seven further exploratory auger borings

1 3 At the time of survey the area was in both arable (cereal) and grass production with the grassland contained in OS 4000 and the northern part of OS 2400

2 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

2 1 Interpolation of climatic variables to obtain site estimates from surrounding grid point data (Met Office 1989) gives the following information for two representative locations on the site

Altitude (m)	40	60
Accumulated Temperature (day °C)	1462	1439
Average Annual Rainfall (mm)	689	699
Field Capacity Days	141	142
Moisture Deficit - wheat (mm)	115	113
- potatoes (mm)	109	106

2 2 In overall climatic terms the above data indicates no limitation on land quality with the area being one of relative warmth and dryness in a national context However interactions between climatic and soil factors namely soil wetness and droughtiness are an important consideration

Site

2 3 The site occupies a drift filled valley feature cut into the Folkestone Beds Altitude varies from about 38-40 m A O D at the lowest point adjoining Workhouse Lane and rises to a maximum of 60 m A O D along the central portion of the northern site boundary Two tongues of the valley feature may be identified firstly along the eastern boundary of OS 1981/part OS 1000 running south eastwards towards Woodgate Road and secondly from the extreme northeast corner of the site is OS 4000 towards Workhouse Lane and the existing excavations

2 4 The most notable topographical feature of the site is the steep east facing slope in OS 4000 Gradients in this locality were measured using an optical reading clinometer which indicated gradients in the range from 5° (or less) to a maximum of 18° The bulk of the steeper slopes were found to be in the range 8°-18° and are consequently a significant agricultural limitation Over the remainder of the site gradients are gentle with a maximum of 4° (typically much less) and do not constitute a limitation in terms of agricultural land quality

Geology and Soils

2 5 The published geological map sheet (I G S 1971) covering the area of the site indicates a spread of drift mantling a valley cut into the Folkestone Beds formation A small exposure of Gault Clay (which overlies the Folkestone Beds) is believed to occur on the highest land of the site (ie above about 60 m A O D) The Folkestone Beds forms a source of building sand The uppermost part of this formation comprises a coarse ironstained sand, but at depth this sand becomes finer and paler (silica sand) and is used in the manufacture of sand lime bricks at Ryarsh (Geol Surv G B 1969)

2 6 The soils of the site are covered by two published Soil Survey maps The soil map of South East England at 1 250 000 scale

(SSEW 1983) indicates the Fyfield 2 Soil Association This is described as 'well drained coarse loamy and sandy soils over sands and sandstones (SSEW 1983) At a similar scale the soil map of Kent (Fordham S J and Green R D (1980)) maps the (Banming Bearsted and Hothfield as the principal soil series These are described as freely draining loamy soils in drift over Lower Greensand beds associated with coarse loamy soils and sandy podsols in Folkestone Beds or residium"

2 7 Detailed inspection of the site indicates that the main soil forming material comprises variable thickness of head or drift deposits over Folkestone Beds The drift may be absent at some locations on the site, for example on parts of the steep slopes to the east of the site

2 8 Soils typically comprise sandy silt loam, sandy clay loam or sandy loam topsoils overlying variable medium or light loamy subsoils (typically sandy clay loam, clay loam, sandy loam or sandy silt loam) Where the finer drift is thinner the lower subsoil comprises loamy medium sand or medium sand derived from the underlying Folkestone Beds

2 9 The soils described above are non-calcareous, mainly very slightly stony (<5% v/v flints), but occasionally slightly stony (up to 12% v/v flints) permeable and well drained (wetness class I) At very occasional locations a heavier slowly permeable lower (clayey) subsoil horizon occurs causing a minor wetness restriction (wetness class II) Minor droughtiness limitations, are however characteristic of much of the land on the site, particularly where the drift thins over the coarser textured deposits

2 10 An exception to the soils described above is the small exposure of significantly heavier textured soils located on the highest land on the site (see para 2 5) These have sandy clay loam topsoils overlying a slowly permeable and gleyed sandy clay subsoil Such soils which are believed to be associated with the basal deposit of Gault Clay have been allocated to wetness class IV and suffer from wetness/workability restrictions

3 AGRICULTURAL LAND CLASSIFICATION

3 1 Land on the site has been graded 1 2 3a, 3b and 4 A range of limitation to agricultural use is represented from no or very minor limitations to limited areas of severe limitation These limitations include droughtiness wetness, stone content and steep gradients A breakdown of the ALC grades in terms of area and proportion is as follows -

Grade	ha	%
1	4 38	27
2	7 80	48
3a	1 51	9
3b	1 39	9
4	0 69	4
Non-agricultural	0 41	3
Total	16 18	100

Grade 1

3 2 Land of this quality occupies over one quarter of the site and is mapped on the western side of the site where the drift cover appears thickest The associated soils are deep non-calcareous non-to very slightly stony sandy silt loam (to silt loam) topsoils over similar textured or slightly heavier (medium clay loam or medium silty clay loam) subsoils The clay content may increase in the lower subsoil (heavy clay loam) At some locations coarser textured horizons occur at depth

3 3 These soils have a good available water capacity and are permeable (wetness class I) Consequently no significant limitation affects this land which is potentially versatile and capable of producing high yields of a very wide range of crops

Grade 2

3 4 Grade 2 land occurs extensively on the site and is associated with areas where the drift is thought to be thinner or where greater incorporation with coarser materials from the Folkestone Beds has occurred Topsoils comprise very slightly stony sandy clay loams sandy silt loams or sandy loams which typically pass to coarser textured materials (sandy loam, loamy medium sand or sand) at depth

3 5 Such soils are typically permeable and well drained (wetness class I) but due to the increased proportion of coarser textured material within the soil profile these soils have minor droughtiness limitations Calculation of soil moisture balances (MAFF, 1988) indicates that these soils can therefore be allocated to a maximum of grade 2

Grade 3

Subgrade 3a

3 6 Land of this quality occurs in a relatively small area of the site towards the southeast corner The associated soils are more droughty than those graded 2 This is due either to a lighter textured soil profile (ie sandy loam topsoil over a progressively lighter subsoil passing to medium sand at c 60 cm+) or a moderately high stone content of flints (topsoil stone contents of 12% v/v flints > 2 cm) within a light to medium loamy subsoil In both cases moisture balance calculations indicate a grading of 3a is appropriate The flinty-soil variant also has an additional topsoil stone limitation which under ALC criteria (MAFF 1988) limits it to a maximum of grade 3a due to the associated impediment to cultivation, harvesting and crop growth

Subgrade 3b

3 7 Grade 3b is confined to the area of moderately steep slopes in OS 4000 together with a smaller area of the higher ground at the northeast corner of OS 2400 This latter area represents the heavier poorly drained clayey soils described in para 2 10 previously These have been allocated to wetness class IV due to the presence of a gleyed slowly permeable subsoil indicative of a moderately severe wetness/workability limitation which results in a grading of 3b

3 8 The remaining area of 3b (ie in OS 2400) represents land having gradients in the range 7-11° Steep gradients have a significant effect on mechanised farm operations and the type of machinery which can be safely and efficiently operated

Grade 4

3 9 Land on the site mapped as grade 4 has a severe limitation due to steep gradients in the range 11-18°

4 SOIL RESOURCES

4 1 Overlays accompanying the ALC plan indicate the broad distribution of soil resources on the site It is emphasised that this is not a soil stripping plan but is an illustration of the soil resources which are available for restoration Soils were sampled to a maximum depth of 100-120 cm, useful soil forming materials may occur below this depth Particle Size Distribution (PSD) data supplied by a consultant* acting for the applicant, together with PSD data obtained as a result of this survey, have been used during the assessment of soil resources

* Tom La Dell

Topsoil

4 2 Three topsoil mapping units have been identified on the basis of textural characteristics

Unit 1

4 3 This comprises 7 78 ha and represents non-calcareous non-very slightly stony dark greyish brown to brown (10YR 3/2-4/2 10YR 4/3) topsoil of predominantly sandy silt loam texture (occasionally medium clay loam or silt loam) The mean depth is 28 1 cm with a range of 23-30 cm

Unit 2

4 4 This occurs in the centre of the site in an area extending to 6 75 ha Topsoils are non-calcareous medium sandy loam or sandy clay loam in texture varying in stone content from non-slightly stony, but locally up to 12%+ v/v flints where measured Colours are typically very dark grey to very dark greyish brown (10YR 3/1-3/2) Mean depth is 28 1 cm with a range of 25-30 cm

Unit 3

4 5 This comprises a variable unit of mixed textural types extending to about 1 65 ha, which changes over short distances The textural range extends from loamy medium sand sandy clay loam to sandy silt loam, presumably reflecting the degree of drift incorporation and the effects of erosion of drift cover on the steeper slopes including rabbit activity The mean depth for the unit is 25 7 cm with a range of 20-33 cm

Subsoil

4 6 It has not proved possible to clearly delineate areas of grouped subsoils due to some variability of the soil forming drift materials and their thickness and degree of incorporation into the underlying Folkestone Beds However, there is a very loose

association with the topsoil units in that the subsoils associated with topsoil unit 2 are typically coarser textured than unit 1 with a higher proportion of sand overall The subsoils equating with topsoil unit 3 are as correspondingly variable at the topsoils It should be borne in mind however, that there is a small area of significantly heavier textured sandy clay subsoils on the highest land on the site (see paras 2 10 and 3 7)

4 7 In overall terms upper subsoils (to 50-60 cm) are non-calcareous and range from sandy loam and sandy silt loam to sandy clay loam and medium and heavy clay loams (occasionally clay or sandy clay) which either extend to a depth of 100-120 cm+ or pass to sandy loam loamy medium sand or sand in the lower subsoil In all cases subsoil or subsoil forming materials extend to a depth of at least 100-120 cm

4 8 Where fully described the subsoil was friable moderately well developed coarse subangular blocky in the upper subsoil where sandy loam or sandy silt loam textures were found becoming weakly developed coarse subangular blocky in sandy loams and sandy clay loams in lower subsoils or mainly weakly to very weakly developed coarse angular blocky where medium sand occurred in the lower profiles

4 9 Stone content is typically very small (<5% v/v) but occasional localised pockets of flintier soils may occur

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Reading

SOURCES OF REFERENCE

FORDHAM S J and GREEN R D (1980) Soils of Kent Bulletin of the Soil Survey of Great Britain

GEOLOGICAL SURVEY OF GREAT BRITAIN (1969) Geology of the Country around Sevenoaks (Explanation of Sheet 287)

INSTITUTE OF GEOLOGICAL SCIENCES (1971) Solid and Drift Edition Geological Map Sheet 287 (Sevenoaks) 1 63360 scale

MAFF (1988) Agricultural Land Classification in 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 Soils of South East England (and accompanying legend)

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

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