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Blackdale Farm, Darenth,
Kent
Statement of Physical
Characteristics
Map and Report
July 1993

STATEMENT OF PHYSICAL CHARACTERISTICS

LAND AT BLACKDALE FARM, DARENTH, KENT

1. INTRODUCTION

1.1 In July 1993 approximately 6 hectares of land at Blackdale Farm, Darenth, Kent was surveyed in connection with proposals for gravel extraction and restoration under the 1981 Minerals Act. ADAS was commissioned by MAFF's Land Use Planning Unit to determine the land quality and site physical characteristics of the land affected by the proposals.

1.2 The survey was conducted by members of the Resource Planning Team, Guildford Statutory Group at an observation density of approximately one boring per hectare. A total of 6 borings and one soil inspection pit were described in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on its use for agriculture.

At the time of survey, the site was under wheat.

1.3 The distribution of the grades and subgrades is shown on the attached ALC map and the area and extent are given in the table below. The map has been drawn at a scale of 1:5000. It is accurate at this scale, but any enlargement may be misleading. This map supersedes any previous information for the site.

Table 1 : Distribution of Grades and Subgrades

	<u>Area (ha)</u>	<u>% of agricultural land</u>
Grade 1	4.77	79.8
2	0.90	15.0
3a	0.31	5.2
Total agricultural area	<u>5.98</u>	<u>100</u>
Total area of site	<u>5.98</u> ha	

1.4 A general description of the grades and land-use categories identified in this survey is provided as an appendix. The grades are described in terms of the type of limitation that can occur, the typical cropping range and the expected level and consistency of yield.

2. CLIMATE

- 2.1 Climatic criteria are considered first when classifying land since climate can be over-riding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.
- 2.2 Estimates of climatic variables relevant to the assessment of land quality were obtained by interpolation from a 5km grid point dataset, (Met Office, 1989) for a representative location in the survey area.

Table 2: Climatic Interpolation

Grid Reference	TQ561725
Altitude (m,AOD)	15
Accumulated Temperature (°days, Jan-June)	1487
Average Annual Rainfall (mm)	577
Field Capacity Days	109
Moisture deficit, wheat (mm)	124
Moisture deficit, potatoes (mm)	121

- 2.3 The main parameters used in the assessment of an overall climatic limitation are, average annual rainfall, a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality. In this instance, climate does not represent an overall limitation to agricultural land quality. In addition, no local climatic factors such as exposure or frost risk are significant.
- 2.4 However, climatic factors, specifically field capacity days and soil moisture deficits, do interact with soil factors to influence soil wetness and droughtiness limitations. At this locality, the climate is very dry in both a regional and national context. The low number of days when soils are at field capacity and the correspondingly high moisture deficits will increase the risk of soil droughtiness, although problems associated with soil wetness and workability are less likely to occur.

3. RELIEF

- 3.1 The site lies at an altitude of 15-20 m AOD. The majority of the site lies within a slight valley, with land rising gently towards the northern and southern boundaries of the site. Nowhere on the site do altitude or gradient affect agricultural land quality.

4. GEOLOGY AND SOILS

- 4.1 British Geological Survey, Sheet 271, Dartford (1977) shows the site to be underlain by Recent and Pleistocene Flood Plain Gravel deposits which rest on Cretaceous Upper Chalk.

- 4.2 Soil Survey of England and Wales, Soils of Kent (1980) maps brown calcareous earths at this locality. These are described as being 'variably chalky and flinty silty soils in Head associated with shallow chalky silty soils over chalk'.
- 4.3 Detailed field examination of the site indicates the presence of soils somewhat dissimilar from those described by the Soil Survey. In general terms, deep, well drained soils were found to be slightly stony, calcareous and loamy. There was no evidence of shallow soils over chalk.

5. AGRICULTURAL LAND CLASSIFICATION

- 5.1 The ALC grading of the site is primarily determined by the interaction between soil and climatic factors. Most of the site has been graded excellent quality, grade 1 whilst a small area has been assigned to very good quality, grade 2 on the basis of a slight droughtiness limitation. Locally, topsoil stone contents give rise to grade 3a (good quality) land.
- 5.2 Table 1 provides details of the area and extent of each grade. The distribution of ALC grades is shown on the attached ALC map.

- 5.3 The location of the soil observation points is shown on the attached auger boring map.

5.4 Grade 1

Land of excellent quality has been assigned to the majority of the area surveyed. Profiles typically comprise calcareous, fine sandy silt loam, or occasionally, medium clay loam topsoils containing up to 5% total flints by volume. Subsoils of similar texture are slightly stony, (ie, 5-10% total flints by volume) and calcareous throughout.

A number of observation points were found to be impenetrable (to soil auger) due to the combination of slight stoniness and extremely dry soil conditions although profiles were thought to extend to depth. Profiles are well drained, wetness class I, and have good reserves of available water. The land therefore has no or only very minor limitations to agricultural use and is capable of supporting a wide range of arable and horticultural crops at consistently high yields.

5.5 Grade 2

Very good quality agricultural land has been mapped towards the south of the site. Topsoils are similar to those described in section 5.4 above but subsoils tend to become heavier with depth, typically passing from medium clay loam to heavy clay loam and clay in the lower subsoil. Profiles are slightly stony (ie, 5-10% total flints by volume) and calcareous throughout. Gleying was evident in the subsoil below 50 cm and slowly permeable clay horizons were encountered from about 65 cm depth. Given these characteristics of slight drainage impedence, wetness class II is appropriate. However, this does not represent a soil *wetness limitation due to the light topsoil texture*.

This land is limited by a slight soil droughtiness risk arising from the combination of subsoil textures and high moisture deficits. Reserves of soil water available for crop growth are slightly reduced to the extent that grade 2 is appropriate, although this land is still capable of supporting a wide range of agricultural crops.

5.6 Grade 3a

A small unit of good quality, grade 3a, land has been mapped in association with a localised area of relatively high topsoil stone contents. Soils are very similar to those described in section 5.4, being deep, and well drained, but topsoil stone contents of 12% by volume flints >2cm, (17% total flints by volume) were measured. Such stone contents have the effect of increasing the cost and efficiency of cultivations through wear on farm machinery and an adverse effect on crop establishment, growth and quality.

6. SOIL RESOURCES

Soil Units: Consideration for Restoration

6.1 The following section and the accompanying soil resource maps describe the pattern of topsoil and subsoil resources on the site. It should be emphasised that the maps are not soil stripping maps, but 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 sampled to a maximum depth of 120 cm during survey work. In some cases soil resources will extend below this depth.

6.2 Topsoils

One topsoil unit was identified. It comprises an average 29.7 cm of brown or dark greyish brown, (10YR4/3 or 10YR4/2) fine sandy silt loam or very occasionally medium clay loam. These topsoils were found to be calcareous and slightly stony typically containing 5% total flints. Exceptionally stone contents were higher at around 15-20% total flints by volume.

These topsoils are well structured having moderately well developed medium sub-angular blocky peds of friable consistence. They are very porous and very well rooted.

6.3 Subsoils

Two subsoil units were identified.

Unit 1 : This unit is very uniform and comprises an average 90.2 cm of fine sandy silt loam, occasionally passing to medium clay loam in the lower subsoil. These yellowish brown (10YR5/4) subsoils are calcareous throughout and contain between 5 and 17% total flints by volume, although more usually, only around 5%. They show no evidence of drainage imperfections and are well aerated and rooted.

This subsoil unit has moderately good structures throughout, comprising moderately well developed coarse sub-angular blocky peds of firm consistence in the upper subsoil above about 70 cm. Below this depth moderately well developed coarse angular blocky peds are very friable. Pit 1 described at Appendix III is typical of this subsoil unit.

Unit 2 : This subsoil unit is localised in extent, corresponding with the area assigned to grade 2 where soils are slightly heavier than elsewhere on the site. The unit comprises an average 91 cm of medium or heavy clay loam passing to slowly permeable clay at around 65 cm depth. There is slight drainage impedance and surface water gleying is evident from about 50 cm depth. This is likely to result from the slow permeability of the clay horizon in the lower subsoil. These yellowish brown (10YR5/4) to strong brown, (7.5YR5/6) subsoils are calcareous and contain approximately 5% total flints by volume.

Due to the limited extent of this subsoil unit, its structural condition was not assessed.

4.4 Table 3 : Subsoil Resources

	<u>Topsoil</u>	<u>Subsoil</u>		<u>Total Soil Resource</u>
		1	2	
Average depth (cm)	29.7	90.2	91.0	
Area (ha)	5.98	5.08	0.90	
Volume (m ³)	17761	45822	8190	71,773m ³

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Resource Planning Team
 Guildford Statutory Group
 ADAS Reading

SOURCES OF REFERENCE

- British Geological Survey (1977) Sheet 271, Dartford, 1:50,000 Drift edition.
- MAFF (1988) Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.
- Meteorological Office (1989) *Climatic datasets for Agricultural Land Classification*.
- Soil Survey of England and Wales (1980) Soils of Kent, 1:250,000 map and accompanying legend.