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PINDEN QUARRY, NEAR LONGFIELD, KENT

**Agricultural Land Classification &
Statement of Site Physical Characteristics**

January 1992

**Resource Planning Team
Eastern Region
FRCA Reading**

**RPT Job Number: 2009/034/91
MAFF Reference: EL 20/00528**

STATEMENT OF PHYSICAL CHARACTERISTICS

PINDEN QUARRY, NR LONGFIELD, KENT

1. BACKGROUND

1.1. This 10.0 ha site was surveyed on 22nd January 1992 in connection with proposals for chalk extraction as an extension to the adjoining quarry. The site lies to the south east of Dartford (5.5 km) and to the north of the settlement of Longfield. The area is bounded to the east by a 'B' Class road and a disused railway line, to the south by current chalk extraction workings and to the west by a field boundary. The northern boundary of the site is not defined by any hard physical feature.

1.2. The area was surveyed using 1.2m Dutch Soil Augers, samples being taken approximately every 100m on a grid basis. In addition 2 soil pits were examined.

Land Use

1.3. At the time of the survey, the land was under arable use having been ploughed prior to seed drilling. A small depression to the west of the site was being used as a dump for vegetables and old machinery.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1. The altitude of the site varies between 50 and 55m AOD. The highest land occurs towards the south, falling gently to the north. Gradient is not a limitation in terms of land quality at this site.

Climate

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

Climatic Interpolation

Grid Reference	TQ 594 699	TQ 598 698
Altitude (mAOD)	50	55
Accumulated Temperature Days (degree days Jan-June)	1447	1442
Average Annual Rainfall (mm)	601	601
Moisture Deficit (Wheat-mm)	118	118
Moisture Deficit (Potatoes-mm)	113	113
Field Capacity Days	118	118

- 2.3. Climatic factors per se place no limitations on agricultural land quality in this area; but they can affect the interaction of soil factors with the climate, namely wetness and droughtiness. This area is characterised by relative dryness in a national context.

Geology and Soils

- 2.4. The British Geological Survey (B.G.S.), sheet 271, Dartford (1:50000 series, 1977), shows the entire area to be underlain by Cretaceous Upper Chalk. This being described as 'a white Chalk with bands of flint' (B.G.S. 1977).
- 2.5. The soils of the area have been mapped by the Soil Survey of England and Wales (SSEW) as part of Bulletin 9 (1980), Soils of Kent and Bulletin 15 (1984), Soils of South East England. The map accompanying the former publication indicates the site to be underlain by brown calcareous earth type soils. The map described in the latter publication shows the site area to comprise soils of the Andover 1 Association, commonly either a chalky silty brown rendzina or a fine silty typical calcareous brown earth.

2.6. Detailed field examination indicated the presence of two soil types overall. Firstly are those having calcareous heavy silty clay loam or heavy clay loam topsoil, containing an average of 5% flints. This overlies a similarly textured but virtually stoneless upper subsoil, gradually becoming more stony (flints up to 10%) and chalky (up to 50%) prior to becoming pure chalk between 40cm and 90cm. Generally the shallower the depth to chalk, the narrower the stoneless horizon. These soils are permeable and well drained (Wetness Class I).

2.7. The second soil type is typically a very slightly stony (3% total average) non-calcareous heavy silty clay loam or heavy clay loam topsoil, overlying a similarly or slightly heavier textured virtually stoneless upper subsoil. The lower subsoil is variable, ranging from stoneless to very stony (0 to 50% flints and sometimes chalk combined) heavy silty clay loam or heavy clay loam. These profiles extend to 120 cm, occasionally becoming mottled and gleyed in the lower subsoil (45 to 75 cm). Despite this these soils are generally not slowly permeable, being well drained (Wetness Class I), although the occasional profile is moderately well drained (Wetness Class II).

3. AGRICULTURAL LAND CLASSIFICATION (ALC)

3.1. The ALC grading of the survey area is primarily determined by interactions between climate and soil factors, namely wetness/workability and droughtiness. ALC grades of 2 and 3a were noted at this site and a breakdown of these in terms of area is given below:-

Grade	Area (ha)	% of total Agricultural Land
2	8.24	83.1
3a	1.67	<u>16.9</u>
		100.0
Non-Agricultural Area	= 0.08	
Total Site Area	= 9.99	

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

Grade 2

3.3. Grade 2 land occurs as approximately 83% (8.2 ha) of the total agricultural land at this site and occurs as a single block covering the middle and lower slopes in the northern and eastern areas of the site. The soils are predominantly those described in paragraph 2.7, with some of the deeper soils over chalk (see para 2.6) also included.

The borings are limited to this grade by a combination of factors. Most common is a slight workability restriction due to the heavy texture of the topsoil. In addition, profiles also have minor droughtiness limitations, particularly where they pass to chalk within 120 cm or have stonier horizons. This is exacerbated by the dry climate of the area (Met. Office 1989).

3.4. Grade 3a

Land of this quality occurs over the remaining 17% (1.7 ha) of the site, in a single block located on the higher land towards the southern site border. Soil profiles in this area are of a broadly similar type, being slightly stony to very slightly stony (up to c.6% flints >2 cm), heavy, occasionally medium, silty clay loam or clay loam topsoil over a similarly textured upper subsoil, containing up to 50% weathered chalk fragments. This overlies pure chalk between 40 and 70 cm. Profiles are limited to this grade by droughtiness due to a chalk substratum being encountered at relatively shallow depths.

4. SOIL RESOURCES

4.1. The description of soil units given below, provides an indication of the soil resources on the site. It should be emphasised that this information should not be viewed in the context of soil stripping, but as an illustration of the soil resources available for restoration in the surveyed area.

When considering these details, it is important to remember that soils were only sampled to a maximum depth of 120 cm during survey work, occasionally less where impenetrable chalk was encountered. In some cases soil resources may extend beyond this depth.

Topsoil

- 4.2. One topsoil unit was identified across the site. This comprises a predominantly dark brown to dark greyish brown to dark brown (10YR 3/3 - 4/2 - 4/3) slightly stony (average 5% >2cm v/v) heavy, occasionally medium silty clay loam. The mean depth of this layer is approximately 27 cm with a range of 23 to 29 cm. Where soils are shallow over chalk topsoils are highly calcareous.

Subsoil

- 4.3. Two subsoil units were observed during field examination. The most extensive (unit 1) comprises in its upper part, brown to yellowish brown (10YR 4/3 - 4/4 - 5/4) stoneless heavy silty clay loam, occasionally a slightly heavier clay, which may be calcareous. With increasing depth the textures are heavier, occasionally mottled and gleyed. They are very slightly to moderately stony (up to c.30% flints and chalk) with yellowish brown (10YR 5/4 - 5/6) clay or silty clay. Occasionally the soil becomes lighter textured below 65 cm, where chalk occurred or where fine sand content increased to give heavy silty clay loam or heavy clay loam of similar colouration to above horizons. Where examined the subsoil structures comprised in the upper subsoil (50 cm and above), a friable, moderately well developed medium subangular blocky structure having <0.5% biopores. Below approximately 50 cm, structures altered to become coarse subangular blocky again moderately well developed and friable and with <0.5% biopores.
- 4.4. The second subsoil unit (unit 2) occurs where soil depths are shallower over chalk. The upper subsoil consists of a calcareous brown to yellowish brown (10YR 4/3 - 4/4 - 5/6) heavy silty clay loam containing a few large flints. This overlies the lower

subsoil (35 to 45 cm+) comprising a moderately to very calcareous (weathered chalk stones up to c.50%) heavy silty clay loam varying in colour from yellowish brown (10YR 5/6) to dark brown (10YR 3/3) and white (10YR 8/1) where chalk content is highest. Where harder rubbly chalk is encountered at a shallow depth (c.40 cm), the highly calcareous subsoil horizon constitutes the majority of the subsoil with pockets of the less calcareous material.

When examined the structure of these upper horizons was difficult to isolate due to their high chalk content. However it was typically very friable and loose. Below the horizons of soil material the profiles comprise rubbly weathered white chalk containing approximately 10% large flints.

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April 1992

Ref: 2009/034/91

REFERENCES

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MAFF (1988) "Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land". HMSO.

METEOROLOGICAL OFFICE (1989): "Climatological data sets for Agricultural Land Classification".

SOIL SURVEY OF ENGLAND AND WALES (1980): "Bulletin 9 - Soils of Kent". Harpenden.

SOIL SURVEY OF ENGLAND AND WALES (1984): "Bulletin 15 - Soils and their Use in South East England". Harpenden.

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: 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.