

AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

EXTENSION TO CLOUD HILL QUARRY, BREEDON ON THE HILL, LEICESTERSHIRE

1.0 BACKGROUND

- 1.1 A site of approximately 14.5 ha in extent to the south of the existing Cloud Hill Quarry to the north east of the village of Worthington in Leicestershire is the subject of a planning application to extend the existing quarry.
- 1.2 The site consists of a single block of land centred on grid reference SK 412 208. At the time of the present survey the land had predominantly been sown to winter cereals with a small area in the south east of the site remaining in cereal stubble from a previous crop.
- 1.3 On the published 1:63 360 scale Agricultural Land Classification (ALC) map (MAFF, 1971) the site as a whole is mapped as Grade 3. This map is only of a reconnaissance nature and hence the current detailed survey was carried out to provide site specific ALC and soils information.
- 1.4 The site was surveyed on a 100 m grid basis using a dutch auger to a depth of 120 cm wherever possible. In addition two soil pits were dug to assess subsoil structure in more detail.

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 Climatic criteria are considered first when classifying land as these may have an overriding limitation in terms of the agricultural use of the land. The main parameters used in the assessment of the overall climatic limitation are average annual rainfall, as a measure of overall wetness, and accumulated temperature (day °C Jan-June), as a measure of the relative warmth of an area.
- 2.2 A detailed assessment of the prevailing climate for the site has been made by interpolation from the 5 km grid dataset produced by the Meteorological Office (Met. Office, 1989). The details are given in Table 1 and these show that there is no overall climatic limitation affecting the site.

Table 1 : Climatic data

| | |
|--|------------|
| Grid Reference | SK 412 208 |
| Altitude (m, AOD) | 80 |
| Accumulated Temperature Day °C, Jan-June | 1374 |
| Average Annual Rainfall (mm) | 663 |
| Moisture Deficit, Wheat (mm) | 102 |
| Moisture Deficit, Potatoes (mm) | 92 |
| Field Capacity Days | 150 |
| Overall Climatic Grade | 1 |

Altitude and Relief

- 2.3 The site is generally level or gently sloping towards a small shallow valley in the western part of the site running north/south. Therefore neither gradient or relief impose any limitation on the agricultural quality of the site.

Geology and Soils

- 2.4 The published 1:50 000 scale geology map (Geol. Survey, 1976) shows the majority of the site to comprise Triassic Keuper Sandstone with bands of Marl. Alluvium is mapped along the valley in the west of the site and a small area of Carboniferous Limestone shales is shown close to the cottages in the north west of the site.
- 2.5 The reconnaissance (1:250 000 scale) soil survey map for the area (Soil Survey, 1983) shows the site to comprise in the east soils of the Hodnet association (*1) and in the west soils of the Bromsgrove association (*2).
- 2.6 A more detailed survey published by the Soil Survey (1975) at a scale of 1:25 000 shows the presence of additional soil types within the site. In the west the Bromsgrove association (*2) is shown with Fladbury 2 association (*3) soils mapped along the small valley. Further to the east Bromsgrove - Staunton soils series of the Bromsgrove association (*2) are mapped and in the extreme east of the site the Hodnet association (*1) soils are shown.
- 2.7 The present detailed survey of the site shows the presence of three main soil types which are described briefly overleaf. Physical characteristics of the three soil types are contained in Appendix 1.

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- (*1) **Hodnet association:** Reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar well drained reddish fine loamy soils.
- (*2) **Bromsgrove association:** Well drained reddish coarse loamy soils mainly over soft sandstone, but deep in places. Associated fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.
- (*3) **Fladbury 2 association:** Stoneless clayey soils variably affected by groundwater, some with sandy subsoils. Some similar fine loamy soils.

Soil Type 1 (See Appendix 1 and Soil Type distribution map)

- 2.8 Soil Type 1 covers the largest area and is located in the centre and south east of the site. This Soil Type consists of a very slightly stony heavy clay loam/clay textured topsoil overlying a reddish brown very slightly stony clay/silty clay textured subsoil. This subsoil usually extended to below sampling depth but occasionally was found to overlie slightly stony loamy medium sand or medium sand textured lower subsoil. The clay/silty clay textured subsoil horizon was found to constitute a slowly permeable layer and hence profiles of this soil type were assessed as Wetness Class IV. However, in the south of the site the clay/silty clay textured horizon was too thin to constitute a slowly permeable layer and overlay permeable sandy textured material and hence this area was assessed as Wetness Class I.

Soil Type 2 (See Appendix 1 and Soil Type distribution map)

- 2.9 This Soil Type is located in the south west of the site and is principally associated with the shallow valley feature. A stoneless clay textured topsoil overlies a similar textured upper subsoil which usually extended to below sampling depth. Occasionally the clay textured subsoil was found to overlie a stoneless medium clay loam textured lower subsoil which contained increasing quantities of sandy inclusions with depth. The clay textured subsoil horizon was found to constitute a slowly permeable layer and hence profiles of this soil type were assessed as Wetness Class IV.

Soil Type 3 (See Appendix 1 and Soil Type distribution map)

- 2.10 Soil Type 3 is located in the north of the site and comprises a medium clay loam, or occasionally heavy clay loam, textured topsoil overlying a similar textured upper subsoil horizon. This upper subsoil overlies a loamy medium sand textured lower subsoil horizon. The topsoil and upper subsoil were found to be only very slightly stony, however, the stone content of the lower subsoil

was very variable and ranged from stoneless to extremely stony. The profile was well drained and hence was assessed as Wetness Class I.

3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The land has been classified using the guidelines contained in the Agricultural Land Classification of England and Wales (MAFF, 1988). A breakdown of the extent of the individual grades within the site is given in Table 2 and the definition of the grades and subgrades is contained within Appendix 2.

Table 2 : Distribution of grades and subgrades

| Grade | Area (ha) | % of site |
|------------|------------|------------|
| | 4.6 | 32 |
| 2 | 9.8 | 68 |
| 3b | 0.1 | Negligible |
| Other land | | |
| TOTAL | <hr/> 14.5 | <hr/> 100 |

Grade 2

3.2 Land of this grade is associated principally with Soil Type 3 (paragraph 2.10) which is well drained (Wetness Class I) but suffers from a slight droughtiness limitation. A further small area of Grade 2 land is found in the south of the site associated with Soil Type 1 (paragraph 2.8) in which the upper clay/silty clay subsoil horizon is too thin to constitute a slowly permeable layer. Within this small area the soil profile of Soil Type 1 is assessed as Wetness Class I and land quality is determined by a slight droughtiness limitation.

Subgrade 3b

3.3 Land of this subgrade is associated with the majority of Soil Type 1 (paragraph 2.8) and Soil Type 2 (paragraph 2.9). Within both of these soil

types the clay/silty clay or clay textured upper subsoil horizon constitutes a slowly permeable layer. Hence the soil profile for these soil types is assessed as Wetness Class IV which together with the clay/heavy clay loam textured topsoils result in a significant wetness and workability limitation.

Other Land

- 3.4 A small area of houses and associated gardens in the north-west of the site is mapped as other land.

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REFERENCES

- GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES),
1976. Sheet 141, Loughborough, 1:50 000 scale.
- MAFF, 1971. Agricultural Land Classification Map. Provisional. Scale 1:63 360
Sheet 121.
- MAFF, 1988. Agricultural Land Classification of England and Wales (Revised
Guidelines and Criteria for grading the quality of agricultural land). Alnwick.
- METEOROLOGICAL OFFICE, 1989. Climatological Data for Agricultural Land
Classification. Bracknell.
- SOIL SURVEY OF ENGLAND AND WALES, 1975. Sheet SK 32/42, Melbourne,
1:25 000 scale.
- SOIL SURVEY OF ENGLAND AND WALES, 1975. Sheet 3, "Soils of Midland
and Western England". 1:25 000 scale.

Appendix 1

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

Soil Type 1

| | | | |
|----------------------------------|---------------|---------|---|
| Topsoil | Texture | : | heavy clay loam/clay |
| | Colour | : | dark reddish grey (5YR4/2), occasionally weak red (2.5YR4/2). |
| | Stone | : | very slightly stony (3%) |
| | Boundary | : | abrupt, smooth |
| | Roots | : | many, fine |
| | Depth | : | 30 cm |
| | Upper Subsoil | Texture | : |
| | Matrix colour | : | reddish brown (2.5YR4/3, 4/4) |
| | Mottles | : | predominantly none, occasionally common. |
| | Stone | : | very slightly stony (3%) |
| | Structure | : | weakly developed coarse and very coarse angular blocky. |
| | Consistence | : | firm/very firm |
| | Porosity | : | <0.5% biopores |
| | Boundary | : | abrupt, smooth |
| | Roots | : | many, fine |
| | Depth | : | usually 120 cm, occasionally lower subsoil present. |
| Lower Subsoil (where present) | Texture | : | loamy medium sand/medium sand |
| | Matrix colour | : | reddish brown (2.5YR4/4)/yellowish brown (10YR5/6). |
| | Mottles | : | none |
| | Stone | : | slightly stony (8%) |
| | Structure | : | single grain |
| | Roots | : | common, fine |
| | Depth | : | 120 cm |

Soil Type 2

| | | | |
|----------------------------------|---------------|---------|---|
| Topsoil | Texture | : | clay |
| | Colour | : | dark brown (7.5YR4/2) |
| | Stone | : | stoneless |
| | Boundary | : | abrupt, smooth |
| | Roots | : | many, fine |
| | Depth | : | 30 cm |
| | Upper Subsoil | Texture | : |
| Matrix colour | | : | reddish brown (5YR5/2) |
| Mottles | | : | many distinct ochreous mottles |
| Stone | | : | stoneless |
| Structure | | : | weakly developed coarse and very coarse angular blocky. |
| Consistence | | : | very firm |
| Porosity | | : | <0.5% biopores |
| Boundary | | : | abrupt, smooth |
| Roots | | : | many, fine |
| Depth | | : | usually 120 cm, occasionally lower subsoil present. |
| Lower Subsoil (where present) | | Texture | : |
| | Matrix colour | : | reddish grey (5YR5/2), brown (7.5YR5/2) |
| | Mottles | : | many distinct ochreous mottles |
| | Stone | : | stoneless |
| | Porosity | : | <0.5% biopores |
| | Structure | : | weakly developed very coarse angular blocky. |
| | Roots | : | common, fine |
| | Depth | : | 120 cm |
| | Comments | : | where lower subsoil is present this may become increasingly sandy with depth. |

Soil Type 3

| | | |
|----------------------------------|---------------|--|
| Topsoil | Texture | : medium clay loam, occasionally heavy clay loam. |
| | Colour | : dark brown (7.5YR4/2), dark reddish grey (5YR4/2). |
| | Stone | : very slightly stony (2%) |
| | Boundary | : abrupt, smooth |
| | Roots | : many, fine |
| | Depth | : 30 cm |
| Upper Subsoil | Texture | : medium clay loam/ heavy clay loam |
| | Matrix colour | : brown (7.5YR5/4), reddish brown (5YR5/4). |
| | Mottles | : few feint ochreous mottles |
| | Stone | : very slightly stony (3%) |
| | Structure | : weakly developed coarse subangular blocky. |
| | Consistence | : firm |
| | Porosity | : >0.5% biopores |
| | Boundary | : abrupt, smooth |
| | Roots | : many, fine |
| | Depth | : 65 cm |
| Lower Subsoil (where present) | Texture | : loamy medium sand |
| | Matrix colour | : brown (7.5YR5/3), light yellowish brown (10YR6/4), reddish brown (5YR5/4). |
| | Mottles | : none |
| | Stone | : variable - stoneless - extremely stony (60%). |
| | Structure | : single grain |
| | Roots | : common, fine |
| | Depth | : 120 cm |

Appendix 2

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 include 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 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 levels of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yield of which are variable. In most 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.