

STATEMENT OF PHYSICAL CHARACTERISTICS

SHELLINGFORD QUARRY, OXFORDSHIRE

## STATEMENT OF PHYSICAL CHARACTERISTICS

### SHELLINGFORD QUARRY, OXFORDSHIRE

#### 1. BACKGROUND

- 1.1 This site was surveyed in December 1992 in connection with proposals to extend the existing quarry for mineral extraction. This department was consulted in accordance with the 1981 Minerals Act. The site is situated to the east of Shellingford in Oxfordshire, south of the A417. The existing quarry and a track form the northern boundary, whilst fencing acts as the remaining boundaries.
- 1.2 The site was surveyed using 110 cm Dutch soil augers with samples being taken at regular 100 m intervals on a grid basis. Two soil pits were examined to enable more detailed soil description.

#### Land-Use

- 1.3 At the time of survey the northernmost field was under winter cereals whilst of the two fields to the south of the site, one had been recently ploughed and the other was in permanent grassland.

#### 2. PHYSICAL FACTORS AFFECTING LAND QUALITY

##### Relief

- 2.1 The site lies at an altitude of about 80-88 m AOD and falls gently towards the south. Gradient nor altitude affect the land quality on this site.

##### Climate

- 2.2 Climatic information was obtained by interpolation from a 5 km grid database (Met. Office, 1989) for a representative location in the survey area. Figures are adjusted for altitude.

##### Climatic Interpolation

Grid Reference	SU 324 936
Altitude (m, AOD)	85
Average Annual Rainfall	666
Accumulated Temperature (°days Jan-June)	1426
Field Capacity Days	139
Moisture deficit, wheat (mm)	107
Moisture deficit, potatoes (mm)	99

- 2.3 There is no overall climatic limitation at this locality. However, the interaction between soil and climatic factors is important in influencing soil wetness and droughtiness limitations.

##### Geology and Soils

- 2.4 British Geological Survey, Sheet 253, Abingdon (1971) shows the site to be underlain by Corallian limestone of the Jurassic era.

- 2.5 Soil Survey of England and Wales, Sheet 253, Abingdon (1971) indicates the presence of two soil series across the site. The Sherbourne series is mapped across the majority of the site, these soils being described as, 'fine loamy or clayey over Jurassic limestone', (SSEW, 1971). A small unit of the Shellingford series, (loamy brown earths developed in interbedded Jurassic and Cretaceous loams, sand and clay) has been mapped towards the south-east of the site.
- 2.6 Detailed field examination of the soils, broadly confirms the presence of two soil groups similar to those mapped by the Soil Survey of England and Wales.

### 3. AGRICULTURAL LAND CLASSIFICATION

- 3.1 The ALC grading of the survey area is primarily determined by the interaction between soil and climatic factors, resulting, in particular, in soil droughtiness limitations, although soil wetness also acts as a limitation to a lesser extent. In addition, topsoil stone contents act as a limitation across localised areas. Grades 3a and 3b have been mapped, the area and extent of which is given below:

	<u>Area (ha)</u>	<u>% total agricultural land</u>
Grade 3a	12.27	51
3b	11.98	49
Total area of site	<u>24.25</u>	

- 3.2 A general description of the grades and sub-grades identified in this survey is given at Appendix 1.

#### Grade 3a

- 3.3 Land of this quality occurs across just over half of the site and represents two different situations.

- The majority of land assigned to this grade is associated with soils developed over Corallian limestone. Profiles comprise very slightly stony medium or heavy clay loam topsoils which overlie similar textures or clay in the subsoil. Subsoils tend to become more stony with depth and commonly become impenetrable, (to soil auger), over horizons containing 30-50% v/v limestone brash between about 40-60 cm. Solid limestone which is impenetrable to plant roots occurs from about 80 cm. This land is subject to a moderate droughtiness limitation, the relatively shallow, brashy nature of the soil imposing restrictions on the water available for plant growth.
- Across the far south-eastern corner of the site, soils tend to be deeper. Profiles comprise medium or heavy clay loam topsoils, which may be very slightly stony, overlying clay subsoils to depth. Gleying is evident below about 70 cm, in association with a slowly permeable layer. The combination of these drainage characteristics, topsoil textures and field capacity days, causes this land to be slightly limited by wetness and workability restrictions.

#### Grade 3b

- 3.4 Land graded 3b comprises shallow, brashy soils developed in Corallian limestone similar to those described in section 3.3, the difference being that they are typically shallower and/or more brashy than land assigned to Grade 3a. Profiles comprise medium or heavy clay loam topsoils which contain between 2% and 26% v/v limestone brash >2 cm. These rest directly over impenetrable (to soil auger) horizons containing 30-50% v/v limestone brash or become impenetrable over such horizons within 40 cm. Solid limestone which is impenetrable to plant roots occurs from about 80 cm depth. Profiles are well drained, wetness class I. This land is limited by severe drought risk resulting from relatively shallow soil depth over brashy Corallian limestone.

#### 4. SOIL RESOURCES

##### Soil Units: Consideration for Restoration

4.1 An overlay accompanying the ALC map illustrates the pattern of subsoil resources on the site. Topsoil resources are also present on site, but since there is only one unit, an overlay has not been produced. It should be emphasised that the following 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 sampled to a maximum depth of 100-120 cm during survey work. In some cases, soil resources may extend below this depth.

4.2 One topsoil unit was identified.  
The unit comprises an average 27 cm of brown or dark brown (10YR 4/3 or 10YR 3/3) medium or heavy clay loam. Topsoils tend to be slightly calcareous to calcareous and are variably stony having between 0 and 26% v/v limestone brash >2 cm, in addition to 1-2% <2 cm.

Two subsoil units were identified.

#### 4.3 Unit 1

This unit is extremely limited due to the occurrence of brashy limestone at relatively shallow depth. It comprises an average 12 cm, (ranging from 0 to 31 cm) of dark yellowish brown (10YR 4/4 and 4/6) or strong brown (7.5 YR 4/6) heavy clay loam or clay. These subsoils are calcareous and typically contain between about 2 and 25% v/v calcareous limestone fragments. Profiles pass to horizons containing 30-50% v/v limestone brash within about 60 cm. Such horizons are typically impenetrable to soil auger.

These average structured subsoils have weakly developed medium to coarse sub-angular blocky peds of friable consistence. They are not gleyed or slowly permeable but do have relatively low porosity with <0.5% biopores >0.5 mm.

#### 4.4 Unit 2

This unit is limited in extent and comprises deep, clayey profiles. At least 92 cm of stoneless dark brown or dark yellowish brown (10YR 4/3 or 4/4) calcareous clay is present in this subsoil unit. It is moderately well drained being gleyed and slowly permeable with yellowish brown (10YR 5/6 or 5/8) ochreous mottles and greyish brown or grey (10YR 5/2 for 6/1) grey mottles, from about 70-75 cm.

The upper subsoils above 70-75 cm have average structures being composed of moderately well developed coarse sub-angular blocky peds of friable consistence, having >0.5% biopores. Below 70-75 cm depth, subsoils become poorly structured being composed of weakly developed medium to coarse angular blocky peds of firm consistence. These lower subsoils are gleyed and have <0.5% biopores, thereby being slowly permeable.

#### SOURCES OF REFERENCE

- British Geological Survey (1971) Sheet 253, Abingdon.
- 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 (1971) Sheet 253, Abingdon.
- Soil Survey of England and Wales (1971) Soils of the Wantage and Abingdon District.

## 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: 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.