

**CROSS LEYS QUARRY,  
WITTERING, CAMBRIDGESHIRE.**

**Agricultural Land Classification and  
Statement of soil physical characteristics**

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Eastern Region  
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# AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS REPORT

## CROSS LEYS QUARRY, WITTERING, CAMBRIDGESHIRE.

### INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 19.4 ha of land to the south-west of the village of Wittering alongside the A47 Trunk road adjacent to the existing Cross Leys quarry. This was dormant at the time of the survey. The survey was carried out during March 1999.
2. The survey was carried out by the Farming and Rural Conservation Agency (FRCA) for the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with a planning application by Aggregate Industries UK Ltd. to extract additional mineral reserves within the existing quarry boundary. This survey supersedes previous ALC information for this land. A pipeline runs through the site and this has been excluded from the survey as this will not form part of the extractable area.
3. The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.
4. At the time of survey the land use within the site consisted of a single field of winter sown cereals.

### SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10 000; it is accurate at this scale but any enlargement would be misleading.
6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

| Grade/Other land | Area (hectares) | % site area |
|------------------|-----------------|-------------|
| 2                | 2.2             | 11          |
| 3a               | 5.2             | 27          |
| 3b               | 12.0            | 62          |
| Total site area  | 19.4            | 100         |

7. The fieldwork was conducted at an average density of one boring per hectare. A total of twenty borings and two soil pits was described.

8. The agricultural land within the site has been assessed as predominantly Subgrade 3b (moderate quality agricultural land) with an area of Subgrade 3a (good quality agricultural land) mapped in the south and a small area of Grade 2 (very good quality agricultural land) in the east of the site. Droughtiness is the limiting factor for land quality across the site, with the severity of the droughtiness influenced by the depth to the underlying bedrock.

## FACTORS INFLUENCING ALC GRADE

### Climate

9. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

10. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5 km grid datasets using the standard interpolation procedures (Met. Office, 1989).

**Table 2: Climatic and altitude data**

| Factor                     | Units            | Values     |
|----------------------------|------------------|------------|
| Grid reference             | N/A              | TF 030 005 |
| Altitude                   | m, AOD           | 65         |
| Accumulated Temperature    | day°C (Jan-June) | 1386       |
| Average Annual Rainfall    | mm               | 596        |
| Field Capacity Days        | days             | 117        |
| Moisture Deficit, Wheat    | mm               | 111        |
| Moisture Deficit, Potatoes | mm               | 104        |
| Overall climatic grade     | N/A              | Grade 1    |

11. The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

12. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (AT0, January to June), as a measure of the relative warmth of a locality.

13. The combination of rainfall and temperature at this site impose no overall limitation to land quality and hence the site has a climatic grade of 1.

## Site

14. The site lies to the south and south-east of the existing quarry void at an altitude of approximately 65 m AOD and is generally level or has only gentle undulating slopes. The site therefore has no relief or gradient limitations to the quality of the agricultural land.

## Geology and soils

15. The published 1:50 000 scale geology map of the area, sheet 157, Stamford, (British Geological Survey, 1978) shows the site to be underlain by Lower Lincolnshire Limestone with a thin band of Upper Lincolnshire Limestone running through the centre of the site on a south-west to north-east alignment.

16. The 1:250 000 reconnaissance scale soil survey map for the area (Soil Survey, 1983) shows the majority of the site to comprise soils of the Elmton 1 Association which are described as shallow well drained brashy calcareous fine loamy soils over limestone with some similar deeper soils and some non-calcareous and calcareous clayey soils. A small area in the south of the site is mapped as the Evesham 1 Association which is briefly described as slowly permeable calcareous clayey soils associated with shallow well drained brashy calcareous soils over limestone.

17. During the current, more detailed survey, two soil types were identified, and are described below and shown on the attached soil types map.

### *Soil Type I (17.2 ha)*

18. This soil type covers the majority of the site and consists of a clay or occasionally heavy clay loam textured topsoil usually overlying a similar textured very slightly stony upper subsoil. The stone content of the topsoil varies between approximately 5% and 20% across the site but the topsoil was typically slightly stony. The upper subsoil in turn overlies a very stony horizon with a clay textured matrix between fractured limestone blocks of variable size. This horizon overlies the solid limestone bedrock. Occasionally the upper subsoil is absent from the soil profile and the topsoil directly overlies the very stony subsoil with the bedrock at a shallow depth. The profiles of Soil Type I are typically well drained.

### *Soil Type II (2.2 ha)*

19. This soil type only occurs in the east of the site and consists of a very slightly stony sandy clay loam textured topsoil which overlies a similar upper subsoil horizon, in both horizons the sand fraction was fine. This upper subsoil either directly overlies the limestone bedrock or a lower subsoil of fine sand lies above the bedrock. Profiles of Soil Type II are well drained.

## AGRICULTURAL LAND CLASSIFICATION

20. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

21. The location of the auger borings and pits is shown on the attached sample location map.

### **Grade 2**

22. The small area mapped as Grade 2 in the east of the site corresponds to the area of Soil Type II (paragraph 19). These profiles are well drained and are assessed as Wetness Class I. However, the moisture available within the soil profile is insufficient to meet the full requirements for plant growth hence the soil profiles have a slight droughtiness limitation which restricts the area to Grade 2.

### **Subgrade 3a**

23. Land of Subgrade 3a quality in the south of the site is associated with areas of Soil Type I (paragraph 18) in which the well drained (Wetness Class I) soil profiles are relatively deep. However, the profiles do not provide sufficient moisture for plant growth throughout the growing season and hence the quality of such land is limited by droughtiness. These profiles have a moderate droughtiness limitation which restricts the area to Subgrade 3a.

### **Subgrade 3b**

24. The majority of the site comprises land of Subgrade 3b quality associated with shallow profiles of Soil Type I (paragraph 18). These profiles have a significant droughtiness limitation which restricts the land to Subgrade 3b quality. Occasionally within the area shown as Subgrade 3b quality are profiles of slightly better or worse quality, however, these areas are too small to be mapped separately.

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## **SOURCES OF REFERENCE**

British Geological Survey (1978) *Sheet No. 157, Stamford. Solid and Drift Edition, scale 1:50 000*. BGS: London.

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land*. MAFF: London.

Met. Office (1989) *Climatological Data for Agricultural Land Classification*.  
Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Sheet 3, Midland and Western England*.  
SSEW: Harpenden.

## **APPENDIX I**

### **DESCRIPTIONS OF THE GRADES AND SUBGRADES**

#### **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 or horticultural crops can usually be grown but on some land of this 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 land.

#### **Grade 3: Good to Moderate Quality Land**

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the level of yields. It is mainly suited to grass with occasional arable crops (e.g. 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

## Appendix II

### Statement of Soil Physical Characteristics

#### Soil Type I (17.2 ha)

##### Topsoil

|                   |  |
|-------------------|--|
| Texture           | : Clay, occasionally heavy clay loam                       |
| Colour            | : 10YR5/4, yellowish brown, 10YR4/3, brown                 |
| Stones            | : Slightly to moderately stony (typically 8%, range 5-20%) |
| Roots             | : Many fine  |
| Calcium carbonate | : Slightly calcareous                                      |
| Boundary          | : Abrupt, smooth   |
| Depth             | : 29 cm  |

##### Upper subsoil (where present)

|                      |   |
|----------------------|---|
| Texture              | : Clay, occasionally heavy clay loam                  |
| Colour               | : 10YR6/6, brownish yellow , 10YR5/6, yellowish brown |
| Mottles              | : None  |
| Stones               | : Very slightly to slightly stony (typically 5%)      |
| Structure            | : Weakly developed medium and coarse angular blocky   |
| Consistence          | : Firm  |
| Structural condition | : Poor  |
| Pores                | : <0.5% biopores                                      |
| Roots                | : Common fine   |
| Calcium carbonate    | : Slightly calcareous                                 |
| Boundary             | : Abrupt, smooth                                      |
| Depth                | : 53 cm   |

##### Lower subsoil (or subsoil where upper subsoil absent)

|                   |  |
|-------------------|--|
| Texture           | : Clay   |
| Colour            | : 10YR5/6, yellowish brown, 10YR6/6, brownish yellow |
| Mottles           | : None   |
| Stones            | : Very stony (typically 60%)                         |
| Structure         | : Too stony to determine                             |
| Roots             | : Few fine   |
| Calcium carbonate | : Very calcareous                                    |
| Depth             | : 71 cm over limestone bedrock                       |

#### Wetness Class I



## Appendix II continued

### Soil Type II (2.2 ha)

#### Topsoil

|                   |                                      |
|-------------------|--------------------------------------|
| Texture           | : Sandy clay loam (fine sand)        |
| Colour            | : 10YR5/3, brown                     |
| Stones            | : Very slightly stony (typically 3%) |
| Roots             | : Many fine and very fine            |
| Calcium carbonate | : Non calcareous                     |
| Boundary          | : Abrupt, smooth                     |
| Depth             | : 36 cm                              |

#### Upper subsoil

|                      |  |
|----------------------|--|
| Texture              | : Sandy clay loam (fine sand)                    |
| Colour               | : 10YR5/4, yellowish brown                       |
| Mottles              | : None   |
| Stones               | : Very slightly stony (typically 2%)             |
| Structure            | : Very weakly developed coarse subangular blocky |
| Consistence          | : Friable  |
| Structural condition | : Moderate                                       |
| Pores                | : >0.5% biopores                                 |
| Roots                | : Common fine and very fine                      |
| Calcium carbonate    | : Non calcareous                                 |
| Depth                | : 70 cm  |

#### Lower subsoil (where present)

|                      |   |
|----------------------|---|
| Texture              | : Fine sand   |
| Colour               | : 10YR5/4, yellowish brown                                |
| Mottles              | : None  |
| Stones               | : Stoneless   |
| Structure            | : Very weakly developed fine and medium subangular blocky |
| Consistence          | : Very friable  |
| Structural condition | : Moderate  |
| Pores                | : >0.5% biopores  |
| Roots                | : Few fine and very fine                                  |
| Calcium carbonate    | : Non calcareous  |
| Depth                | : 90 cm over limestone bedrock                            |

Wetness Class : I