

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS REPORT

WESTERN MILTON SAND QUARRY, BUGBROOKE, NORTHANTS

1.0 BACKGROUND

- 1.1 The site covers an area of 34.3 ha, and is the subject of an application to extend sand extraction from the adjacent quarry. Proposed lower level restoration is to agriculture using a limited quantity of inert fill, to a lower level.
- 1.2 ADAS Statutory Resource Planning Team undertook a detailed Agricultural Land Classification and soil physical characteristics survey of the site during April 1996. A total of 36 auger borings were completed on a 100 m grid basis and five soil inspection pits were dug to assess subsoil conditions.
- 1.3 On the published 1:63 360 scale Provisional ALC map (sheet 133, MAFF 1974) all the site is shown as grade 3.
- 1.4 At the time of the survey the majority of the land was under cereal production. A small field along the south west boundary was fallow.

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 Climate criteria are considered 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 Interpolation

| | |
|--|------------|
| Grid Reference | SP 694 575 |
| Altitude (m, AOD) | 85 |
| Accumulated Temperature Day °C, Jan-June | 1390 |
| Average Annual Rainfall (mm) | 640 |
| Moisture Deficit, Wheat (mm) | 141 |
| Moisture Deficit, Potatoes (mm) | 106 |
| Field Capacity Days | 98 |
| Overall Climatic Grade | 1 |

Altitude and Relief

2.3 The site lies on the north east facing valley sides of two small tributaries of the River Nene which run along the eastern and northern edges of the site. The land rises from approximately 74 m AOD in the north east corner of the site to approximately 92 m AOD on the top of a gentle hill in the south west of the site. Nowhere on the site do slopes exceed 5° and thus neither altitude nor gradient constitute a limitation to the ALC grade.

Geology and Soils

2.4 The published 1:63 360 scale solid and drift edition geological map (Geol. Survey, 1969) shows the majority of the site to be covered by Recent glacial sand and gravel deposits. This covers the underlying Jurassic Upper Lias Clay, Marlstone rock and Clays and silts, the latter deposits being exposed in a narrow band along the valley side in the east of the site. Alluvium is mapped immediately in the vicinity of the stream along the eastern boundary.

2.5 No detailed soil map exists of the area but the reconnaissance 1:250 000 scale soil maps "Soils of Eastern England" (Soil Survey of England and Wales,

1983) shows the whole site to be covered by Denchworth association soils. In brief these soils are described as slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils. Also some fine loamy over clayey soils with only slight seasonal waterlogging and some slowly permeable calcareous clayey soils.

- 2.6 Detailed field survey work identified three soils which broadly reflect the geology of the site.
- 2.7 Soil type I (see Appendix 1 for detailed description) comprises the lightest textured soils found on the site and these are mapped on the upper and mid slopes of the valley side. These profiles typically comprise non calcareous very slightly stony medium sandy loam topsoils to 30/35 cm depth. Upper subsoils generally comprise similar or slightly lighter loamy medium sand. Lower subsoils comprise loamy medium sand or medium sand which is variably stony, typically ranging from none to 5% (occasionally 15% small gravel). These profiles are free draining and have been assessed as wetness class I.
- 2.8 The second soil type (see Appendix 1 for detailed description) is mapped in a narrow band along the lower mid slopes and in a small area to the north of Old Lodge Farm. Soil profiles typically comprise very slightly stony, non calcareous medium clay loam or sandy clay loam over similar upper subsoils. However lower subsoils are variable. In most instances from 65/80 cm these comprise very slightly stony clay which is slowly permeable. In a minority of instances lower subsoils become lighter in texture typically medium sandy loam over loamy medium sand. This soil type exhibits a slight drainage impedance in the profile at depth and is typically assessed as wetness class II (very occasionally I or III).
- 2.9 The final soil type (see Appendix 1 for detailed description) is found in two locations and comprises the heaviest soils found on the site. These soils are located on the lowest land in the north and east together with an area on the hilltop in the south west. Both areas comprise non calcareous, very slightly

located on the lowest land in the north and east together with an area on the hilltop in the south west. Both areas comprise non calcareous, very slightly stony heavy clay loam or clay topsoils overlying clay which is slowly permeable immediately below this horizon. In the south west profiles become calcareous at depth. This land has typically been assessed as wetness class IV (occasionally wetness class III).

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 individual grades found on the site is given in Table 2. A description of each grade is given in Appendix 2.

Table 2 : Distribution of grades and subgrades

| Grade | Area (ha) | % of site |
|-------------|-------------|--------------|
| 2 | 12.2 | 35.6 |
| Subgrade 3a | 9.1 | 26.5 |
| Subgrade 3b | 13.0 | 37.9 |
| TOTAL | <u>34.3</u> | <u>100.0</u> |

Grade 2

- 3.2 The grade 2 land occurs in association with two soils types (I and II). Firstly in association with soil type I (see paragraph 2.7) reserves of available water within these coarse loamy soils may be insufficient for crop growth, particularly in the summer months. Thus this land is restricted to grade 2 due to slight droughtiness limitations.
- 3.3 Secondly, soil type II comprises fine loamy profiles which are typically slowly permeable at depth and have been assessed as wetness class II. This land suffers from a slight wetness and workability constraint.

Subgrade 3a

- 3.4 Land graded 3a also occurs in association with soil types I and II. The majority of land graded 3a is associated with the lighter variant of soil type I. Soils are typically sandier in texture in the upper subsoils and result in lower available water capacity for crop growth. Thus this land suffers from a moderate droughtiness limitation which restricts the land to subgrade 3a.
- 3.5 A small area of land graded 3a in the north is associated with soil type II. These soils have been assessed as wetness class III and suffer from moderate wetness and workability limitations.

Subgrade 3b

- 3.6 The subgrade 3b areas lie in conjunction with soil type III (see paragraph 2.9). These heavy soils are slowly permeable at shallow depth and have been typically assessed as wetness class IV (occasionally III). As a result this land suffers from a moderately severe wetness and workability limitation restricting the land to subgrade 3b.

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REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES) 1969.

Solid and Drift Edition, Sheet 202, Towester, 1:63 360 scale.

MAFF 1974. Agricultural Land Classification Map (Provisional), Sheet 133,

1:63 360 scale.

MAFF 1988. Agricultural Land Classification of England and Wales (Revised

Guidelines and Criteria for grading the quality of agricultural land) Alnwick.

METEOROLOGICAL OFFICE 1989. Data extracted from the published

agroclimatic dataset.

SOIL SURVEY OF ENGLAND AND WALES 1983. Soils of Eastern England,

Sheet 4, 1:250 000 scale.

SOIL SURVEY OF ENGLAND AND WALES 1984. Soils and their use in Eastern

England by C A H Hodge *et al.*, Harpenden.

Appendix 1

SOIL PHYSICAL CHARACTERISTICS REPORT

Soil Type I

| | | | | |
|---------------|---------------|----------|---|--|
| Topsoil | Texture | : | medium sandy loam | |
| | Colour | : | 10YR4/3, 7.5YR3/2 and 4/2 | |
| | Stone | : | typically 1-3% flints small and medium angular and subrounded. | |
| | Boundary | : | smooth, abrupt | |
| | Roots | : | many fine and very fine | |
| | Depth | : | 30/35 cm | |
| | Upper Subsoil | Texture | : | medium sandy loam or loamy medium sand. |
| Matrix colour | | : | 10YR4/4, 5/4, 5/5 and 7.5YR4/4 | |
| Mottles | | : | none | |
| Stone | | : | typically 1-5% flints and soft weathered sandstone small and medium subangular. | |
| Structure | | : | weakly developed medium and coarse subangular blocky. | |
| Consistence | | : | very friable | |
| Porosity | | : | >0.5% | |
| Boundary | | : | smooth sharp | |
| Roots | | : | few fine and very fine | |
| Depth | | : | 65/80 cm | |
| Lower Subsoil | Texture | : | loamy medium sand or medium sand | |
| | Colour | : | 10YR4/6, 5/6, 5/4 and 7.5YR5/4, 5/6 | |
| | Mottles | : | none | |
| | Stone | : | 0-3% small subrounded flints (occasionally 10-15% pea gravel). | |
| | Structure | : | single grain | |
| | Porosity | : | >0.5% | |
| | Roots | : | very few fine and v. fine | |
| | Depth | : | 120 cm+ | |
| | | Comments | : | Profiles assessed as wetness class I Non calcareous throughout. |

Soil Type II

| | | |
|---------------|---------------|---|
| Topsoil | Texture | : medium clay loam, occasionally sandy clay loam. |
| | Colour | : 10YR3/3 and 4/3 |
| | Stone | : 1-2% flints, medium subrounded |
| | Boundary | : abrupt, smooth |
| | Roots | : common fine and very fine |
| | Depth | : 25/35 cm |
| Upper Subsoil | Texture | : medium clay loam or sandy clay loam |
| | Matrix colour | : 10YR4/4, 7.5YR5/4 |
| | Mottles | : occasionally few distinct ochreous mottles 10YR5/8. |
| | Stone | : 1-5% medium and small subrounded flints |
| | Structure | : moderately developed coarse and very coarse subangular blocky. |
| | Consistence | : friable |
| | Porosity | : >0.5% |
| | Boundary | : clear smooth |
| | Roots | : common becoming few fine and very fine |
| | Depth | : 65/80 cm |
| Lower Subsoil | Texture | : clay |
| | Colour | : 10YR5/4, 5/3 and 7.5YR5/4 and 5/3 |
| | Mottles | : common distinct ochreous and grey 10YR5/6, 6/6, 6/8 and 2.5Y6/1. |
| | Stone | : 1-3% flints medium subrounded |
| | Structure | : weakly developed adherent coarse of very coarse subangular blocky. |
| | Porosity | : <0.5% |
| | Roots | : few fine and very fine |
| | Depth | : 100 cm+ |
| | Comments | : Typically assessed as wetness class II (occasionally I or III). : Occasionally lower subsoils are sandier at depth. : Some profiles are saturated above the clay. : Non calcareous throughout. |

Soil Type III

| | | | |
|--------------------|---------------|--|---|
| Topsoil | Texture | : | heavy clay loam/clay |
| | Colour | : | 10YR4/3, 10YR4/2 and 2.5Y4/2 |
| | Stone | : | 0-3% flints small and medium rounded and subrounded. |
| | Boundary | : | abrupt smooth |
| | Roots | : | common fine and very fine |
| | Depth | : | 25/30 cm |
| | Upper Subsoil | Texture | : |
| Matrix colour | | : | 10YR5/4, 5/3 |
| Mottles | | : | common distinct ochreous mottles 10YR5/6. |
| Stone | | : | typically 1% small and medium subrounded flints. |
| Structure | | : | weakly developed very coarse subangular blocky. |
| <i>Consistence</i> | | : | <i>firm/v. firm</i> |
| Porosity | | : | <0.5% |
| Boundary | | : | clear smooth |
| Roots | | : | common fine and very fine |
| Depth | | : | 50/70 cm |
| Lower Subsoil | Texture | : | clay |
| | Colour | : | 10YR5/2, 5/3, 2.5Y5/3 |
| | Mottles | : | common distinct ochreous and grey mottles 10YR5/6, 10YR6/1. |
| | Stone | : | typically stoneless (occ. 2% chalk fragments at depth. |
| | Structure* | : | weakly developed coarse prismatic/weakly developed very coarse subangular blocky. |
| | Porosity | : | <0.5% |
| | Roots | : | common fine and very fine |
| Depth | : | 120 cm+ | |
| Comments | : | Profiles typically as wetness class IV, occasionally III. | |
| * | : | Two differing clay soils reflected in different structures in lower subsoil. | |
| | : | Typically non calcareous, occ. becomes calcareous in lower subsoil. | |

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.