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**PROPOSED EXTENSION TO KIRTON
BRICKWORKS, NOTTS.**

**Agricultural Land Classification and
Statement of Soil Physical Characteristics**

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Eastern Region
FRCA Cambridge**

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AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS REPORT

VERIFICATION SURVEY

PROPOSED EXTENSION TO KIRTON BRICKWORKS, NOTTS.

INTRODUCTION

1. This report presents the findings of a verification of the applicants Agricultural Land Classification (ALC) survey of approximately 25 ha of land to the east of the village of Kirton, Nottinghamshire. This is adjacent to the existing workings of the Kirton brickworks centred on grid reference SK 702 687. The survey was carried out during January 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 the application to extend the existing brickworks. This survey supersedes previous ALC information for this land.
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 within the site supported a growing crop of oilseed rape.

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 |
|------------------|-----------------|-------------|
| 1 | 8.9 | 36 |
| 2 | 4.1 | 17 |
| 3a | 11.6 | 47 |
| Total site area | 24.6 | 100 |

7. The fieldwork was conducted at an average density of one boring per two hectares. A total of twelve borings and one soil pit was described.

8. The agricultural land within the site has been assessed as a mixture of Grade 1 (excellent quality agricultural land), Grade 2 (very good quality agricultural land) and Subgrade 3a (good quality agricultural land) due to a varying degree of droughtiness limitation within the soil type present depending on 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 | SK 702 687 |
| Altitude | m, AOD | 60 |
| Accumulated Temperature | day°C (Jan-June) | 1369 |
| Average Annual Rainfall | mm | 608 |
| Field Capacity Days | days | 121 |
| Moisture Deficit, Wheat | mm | 109 |
| Moisture Deficit, Potatoes | mm | 100 |
| 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 is bounded by a railway to the north west, a minor road to the north east. The existing works occupy the south west boundary, with open fields to the south east. The site falls from an altitude of approximately 80 m AOD at the south west corner with generally moderate slopes giving way to generally level land along the northern edge of the site. Along this latter boundary the minimum altitude of approximately 52 m AOD occurs. The site therefore has no relief or gradient limitations to the quality of the agricultural land

Geology and soils

15. The published 1:63 360 scale geology map of the area, sheet 113, Ollerton (East Retford), (Geol. Survey, 1966) shows Keuper Waterstones (flaggy sandstones and marl) occupying the northern two thirds of the site along a south west - north east axis and Keuper Marl (red and green marl with thin sandstones (skerries)) to the south of the site.

16. The 1:250 000 reconnaissance scale soil survey map for the area (Soil Survey, 1983) shows the site as comprising soils of the Hodnet Association in the north west and soils of the Worcester Association in the south east of the site. Soils of the Hodnet Association are briefly described as reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging with some similar well drained reddish fine loamy soils. The Worcester Association is briefly described as slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes and associated with similar non-calcareous fine loamy over clayey soils.

17. During the current, more detailed survey, a single soil type was identified which varied in the depth to the underlying bedrock. Three variants of the main soil type have therefore been differentiated and are described below and shown on the attached soil types map.

Soil Type 1a

18. This is the deepest of the soils on the site and generally extended to below sample depth. Typically the soils within this variant have a reddish brown, medium silty clay loam topsoil which overlies a similar medium silty clay loam or heavy silty clay loam subsoil. Stones were generally absent from the profile which was free draining although occasional manganiferous staining was present within a limited number of profiles. In the western part of this soil type a slightly lighter textured fine sandy silt loam topsoil and subsoil were observed.

Soil Type 1b

19. Soil profiles within this variant were shallower than those of Soil Type 1a and generally overlie weathered bedrock at approximately 70 cm. The topsoil and upper subsoil are generally similar to those of Soil Type 1a being a reddish brown, stoneless, medium silty clay loam topsoil overlying a stoneless medium or heavy silty clay loam. The upper subsoil in turn overlies a heavy silty clay loam or silty clay with variable weathered and hard mudstones which becomes impenetrable bedrock.

Soil Type 1c

20. This soil type constitutes the shallowest soils within the site and is found in the south of the site towards the top of the slope. The soil profile is similar to the other variants, however the upper subsoil contains common weathered fragments of mudstones, siltstones and sandstones. The underlying bedrock is generally encountered between 50 - 60 cm but may be shallower in places.

AGRICULTURAL LAND CLASSIFICATION

21. 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.

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

Grade 1

23. The area corresponding to Soil Type 1a (paragraph 18) has been assessed as Grade 1 quality land. These deep well drained soils have a high available moisture content for plant growth. They are almost stone free and hence this land has no or very minor limitations to agricultural use, resulting in this land being graded 1.

Grade 2

24. The mid slopes of the site corresponding to Soil Type 1b (paragraph 19) have been assessed as Grade 2 quality land. Within this soil type a slight droughtiness limitation due to the restriction of rooting depth within the soil profile is evident. Hence; moisture availability will be insufficient to meet the full demand from the growing crop and therefore these soils will be slightly droughty restricting them to Grade 2. Due to the variability in the depth to bedrock across the site occasional better or worse quality soil profiles are encountered within this area, however, these constitute too small an area to map separately.

Subgrade 3a

25. Towards the top of the slope in the south of the site Subgrade 3a quality land has been mapped. This corresponds to the shallow profiles of Soil Type 1c (paragraph 20) in which rooting depth is restricted by the bedrock. This shallowness of the soil reduces the moisture available for crop growth and therefore a moderate droughtiness limitation restricts the land to Subgrade 3a. The inherent variability in the depth to the bedrock results in occasional soil profiles being of better or worse quality than Subgrade 3a, however, these constitute too small an area to map separately.

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SOURCES OF REFERENCE

Geological Survey of Great Britain (1966) *Sheet No. 113, Ollerton (East Retford). Solid and Drift Edition, scale 1:63 360*. 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 Ia

Topsoil

| | | |
|-------------------|---|---|
| Texture | : | medium silty clay loam, occ. fine sandy silt loam |
| Colour | : | 5YR4/3 & 5YR4/4, reddish brown |
| Stones | : | stoneless |
| Roots | : | common fine |
| Calcium carbonate | : | non calcareous |
| Boundary | : | clear, smooth |
| Depth | : | 33 cm |

Upper subsoil

| | | |
|----------------------|---|---|
| Texture | : | medium or heavy silty clay loam |
| Colour | : | 5YR5/4, reddish brown occ. 5YR4/6, yellowish red |
| Mottles | : | none |
| Stones | : | typically stoneless |
| Structure | : | strongly developed coarse to very coarse angular blocky |
| Consistence | : | firm |
| Structural condition | : | moderate to poor |
| Pores | : | >0.5% biopores |
| Roots | : | common fine |
| Calcium carbonate | : | non calcareous |
| Boundary | : | clear, smooth |
| Depth | : | 74 cm |

Lower subsoil

| | | |
|----------------------|---|--|
| Texture | : | medium or heavy silty clay loam occ. fine sandy silt loam |
| Colour | : | 2.5YR5/4, dark red, 5YR4/6, yellowish red, 5YR3/6, yellowish red |
| Mottles | : | none |
| Stones | : | typically stoneless |
| Structure | : | moderately developed coarse to very coarse subangular and angular blocky |
| Consistence | : | firm |
| Structural condition | : | moderate |
| Pores | : | >0.5% biopores |
| Roots | : | common fine |
| Calcium carbonate | : | non calcareous |
| Depth | : | 120 cm |

Wetness Class I

Appendix II continued

Soil Type Ib

Topsoil

| | | |
|-------------------|---|------------------------|
| Texture | : | medium silty clay loam |
| Colour | : | 5YR4/4, reddish brown |
| Stones | : | typically stoneless |
| Roots | : | common fine |
| Calcium carbonate | : | non calcareous |
| Boundary | : | clear, smooth |
| Depth | : | 33 cm |

Upper subsoil

| | | |
|----------------------|---|---|
| Texture | : | medium or heavy silty clay loam |
| Colour | : | 5YR4/6, yellowish red |
| Mottles | : | none |
| Stones | : | typically stoneless |
| Structure | : | moderately developed coarse prismatic breaking to coarse angular blocky |
| Consistence | : | firm |
| Structural condition | : | poor |
| Pores | : | >0.5% biopores |
| Roots | : | few fine |
| Calcium carbonate | : | non calcareous |
| Depth | : | 60/70 cm |

Lower subsoil

| | | |
|----------------------|---|--|
| Texture | : | heavy silty clay loam |
| Colour | : | 5YR3/6, yellowish red |
| Mottles | : | none |
| Stones | : | typically 25% weathered mudstone |
| Structure | : | moderately developed coarse angular blocky |
| Consistence | : | firm |
| Structural condition | : | moderate |
| Pores | : | >0.5% biopores |
| Roots | : | few fine |
| Calcium carbonate | : | non calcareous |
| Depth | : | 80 cm |

Wetness Class : I

Appendix II continued

Soil Type Ic

Topsoil

| | | |
|-------------------|---|---|
| Texture | : | medium silty clay loam occ. heavy silty clay loam |
| Colour | : | 5YR4/4, reddish brown |
| Stones | : | typically stoneless |
| Roots | : | common fine |
| Calcium carbonate | : | non calcareous |
| Boundary | : | clear, smooth |
| Depth | : | 31 cm |

Upper subsoil

| | | |
|----------------------|---|---------------------------------------|
| Texture | : | heavy silty clay loam occ. silty clay |
| Colour | : | 5YR4/6, yellowish red |
| Mottles | : | none |
| Stones | : | typically stoneless |
| Structure | : | moderately developed coarse prismatic |
| Consistence | : | very firm |
| Structural condition | : | poor |
| Pores | : | >0.5% biopores |
| Roots | : | few fine |
| Calcium carbonate | : | non calcareous |
| Depth | : | 50/60 cm |

Lower subsoil

| | | |
|----------------------|---|---------------------------------|
| Texture | : | silty clay (weathered mudstone) |
| Colour | : | 2.5YR4/4, dusky red |
| Mottles | : | none |
| Stones | : | typically 50% hard mudstone |
| Structure | : | coarse platy |
| Consistence | : | very firm |
| Structural condition | : | poor |
| Roots | : | none evident |
| Calcium carbonate | : | non calcareous |
| Depth | : | 60 cm+ |

Wetness Class : I