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AGRICULTURAL LAND CLASSIFICATION AND SOIL RESOURCE VALIDATION SURVEY

SAND AND GRAVEL EXTRACTION, NORTH KILWORTH, LEICESTERSHIRE

CONTENTS

1.0 THE MAFF AGRICULTURAL LAND CLASSIFICATION SYSTEM

1.1 The MAFF Agricultural Land Classification (ALC) system assesses land quality based on its long term physical potential. Land is assigned to an ALC grade according to the degree to which its inherent physical characteristics impose long term limitations on agricultural use.

1.2 The main physical factors which are taken into account in assessing ALC grade are climate, site, and soil. They may act singly, or in co-ordination to result in varying degrees of constraint on agricultural production. The ALC grade is determined by the most limiting factor present.

1.3 Five main grades of land are recognised ranging from grade 1 land of excellent quality to grade 5 land of very poor quality. Other issues, such as the location of farms, the standard of fixed equipment and the accessibility of land do not affect grading although they may influence land use decisions. The definitions of the five ALC grades are included in Annex 1.

2.0 BACKGROUND TO THE SITES

2.1 The two adjacent sites, of 3.7 ha and 35 ha were inspected in August 1994. The northerly site, the proposed soil storage area, was surveyed at a boring density of one boring per hectare. The southerly site, the proposed extraction area, was surveyed at a semi-detailed density of one boring per two hectares in order to validate the findings of a previous survey by Reading Agricultural Consultants (RAC). A total of 29 auger borings were made on site, supplemented by information from 3 soil inspection pits. At the time of the survey the land was under grass and wheat.

2.2 On the provisional 1 inch to 1 mile published ALC map sheet 133 (MAFF 1974), the area is shown as grade 3. Since this map is of a reconnaissance nature designed primarily for strategic planning purposes, the current survey was undertaken to provide more detailed information on land quality for the site.

3.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

3.1 Site specific climate data has been obtained by interpolating information contained in the 5 km dataset produced by the Meteorological Office (Met. Office 1989).

3.2 This shows that the North Kilworth area has an average annual rainfall of approximately 685 mm. Soils are at field capacity for a relatively long period of about 154 days.

3.3 The accumulated temperature for this area is approximately 1293° days. This parameter gives an indication of the cumulative build up of warmth and in conjunction with rainfall influences the development of soil moisture deficits (SMD*) and hence susceptibility to drought. The soil moisture deficits for wheat and potatoes are calculated as 93 mm and 80 mm respectively.

3.4 As a result of these climatic characteristics, the ALC grading of the sites is restricted to climatic grade 2.

Altitude and Relief

3.5 The two sites lie on the upper valley slopes of a tributary of the Grand Union Canal. Altitudes range from 152 m AOD to 172 m AOD, and neither gradient nor altitude constitute limitations to the ALC grade.

4.0 GEOLOGY AND SOILS

4.1 The published 1:63360 scale solid and drift edition geology map sheet 170 shows the survey area to comprise glacial boulder clay overlying Middle Lias clays and silts.

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* SMD represents balance between rainfall and evapotranspiration which occurs during the growing season. For ALC purposes the SMD's developing under a winter wheat and maincrop potato cover are considered. These "reference" crops have been selected because they are widely grown and in terms of their susceptibility to drought are representative of a wide range of crops.

4.2 The Soil Survey of England and Wales mapped the area in 1983 at a reconnaissance scale of 1:250000. The map indicates that the soils are derived from the underlying boulder clay and have been mapped as predominantly Ragdale Association (*1) with a smaller area of Denchworth Association (*2). The current detailed survey identified two main soil types which only partially correspond to the Soil Associations mapped by the SSEW (1983).

Soil Types (refer to Soil Units map and Soil Physical Characteristics Statement)

4.3 Soils throughout the Soil Storage Area (the northerly site) and to the west of the Extraction Area (the southerly site) comprise very slightly stony heavy clay loam or occasionally medium clay loam topsoils over very slightly stony or stoneless clay subsoils which are sporadically calcareous at depth. Occasionally there are thin heavy clay loam upper subsoils layers lying over the clay.

4.4 Soils in the eastern part of the Extraction Area comprise slightly stony or occasionally moderately stony medium clay loam, sandy clay loam, or occasionally medium sandy loam topsoils. Subsoils comprise medium clay loams or sandy clay loams with stone content varying from very slightly to moderately stony.

5.0 **AGRICULTURAL LAND CLASSIFICATION** (refer to ALC map)

5.1 The definition of the Agricultural Land Classification (ALC) grades are included in Annex 1.

Proposed Soil Storage Area (the northerly site)

Subgrade 3b

5.2 The whole site has been mapped as subgrade 3b and is associated with the heavy textured imperfectly/poorly drained soils described in paragraph 4.3. The soils typically comprise heavy clay loam topsoils over mottled and gleyed clay subsoils.

(*1) Ragdale Association: slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils. Some slowly permeable calcareous clayey soils, especially on slopes.

(*2) Denchworth Association: slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils.

A slowly permeable layer starts either directly below the topsoils or in the upper subsoil, thus wetness class has been assessed as III or IV. Topsoils are generally very slightly stony, and profiles are non-calcareous throughout.

Proposed Gravel Extraction Area (the southerly site)

Subgrade 3a

5.3 The eastern part of the site has been mapped as subgrade 3a and is associated with the lighter textured, stonier soils described in paragraph 4.4. The lighter textures and topsoil/profile stone combine to limit the amount of moisture available to the crop. Thus droughtiness and/or topsoil stone limitations constitute the chief limitation to the ALC grade and restrict the land to subgrade 3a. Occasional profiles within this area are assessed as ALC grade 2. However, they occur only sporadically and do not warrant separate delineation.

Subgrade 3b

5.4 The western part of the site has been mapped as subgrade 3b and is associated with the heavy textured imperfectly/poorly drained soils described in paragraph 4.3. The soils typically comprise heavy clay loam or occasionally medium clay loam topsoils over mottled and gleyed clay subsoils. A slowly permeable layer starts either directly below the topsoil or in the upper subsoil, thus wetness class has been assessed as III or IV. Topsoils are generally very slightly stony and subsoils are occasionally calcareous below 70/80 cm in depth. Occasional profiles are assessed as ALC subgrade 3a. However, they occur only sporadically and do not warrant separate delineation.

Validation of RAC Findings (refer to ADAS ALC and Soil Units map)

5.5 The ADAS survey broadly confirmed that the RAC land classification and soils data and maps are a fair representation of soils and land quality on the proposed gravel extraction area. The discrepancies found are listed below:

i) The ADAS survey found the area of best and most versatile land and the area of soil type A in the east of the site to be slightly larger than the RAC survey.

ii) Within this eastern area, the ADAS survey found that ALC grading of profiles varied between grades 3a and 2. On the basis of this variability, it was decided to grade the whole area as subgrade 3a with no separate area of grade 2 being delineated. The RAC survey, with the benefit of a greater density of auger borings, graded this area as partially 3a, partially grade 2.

6.0 SUMMARY : AGRICULTURAL LAND CLASSIFICATION

Land at North Kilworth (refer to Agricultural Land Classification Map)

6.1 The land is predominantly graded 3b with a smaller area of 3a to the east. A breakdown of land quality in hectares and percentages is provided below.

AGRICULTURAL LAND CLASSIFICATION
Proposed Soil Storage Area (the northerly site)

Grade	ha	%
3b	3.7	100
TOTAL	3.7	100

AGRICULTURAL LAND CLASSIFICATION
Proposed Gravel Extraction area (the southerly site)

Grade	ha	%
3a	11.1	31.7
3b	23.9	68.3
TOTAL	35.0	100.0

6.2 Details of the MAFF agricultural land classification system, the methodology used and the chief limitations to agricultural land quality are provided in sections 1.0 to 5.0 of this report.

August 1994

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REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1969). Solid and Drift edition geology map sheet 170, scale 1:63360.

MAFF (1974). Agricultural Land Classification Sheet 133, 1:63360 scale.

MAFF (1988). Agricultural Land Classification of England and Wales. Revised Guidelines and Criteria for Grading the quality of Agricultural Land. Alnwick.

METEOROLOGICAL OFFICE. Data extracted from the published agroclimatic dataset.

SOIL SURVEY OF ENGLAND AND WALES (1983). Map entitled "Soils of Eastern England". Sheet 4, 1:250000 scale.

ANNEX 1

Appendix 1

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 (eg. 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.

Appendix 2

SOIL PHYSICAL CHARACTERISTICS STATEMENT

SOIL TYPE 1

Topsoil	Depth	:	0-27/30 cm
	Texture	:	medium clay loam, sandy clay loam, or occasionally medium sandy loam.
	Colour	:	10YR4/3 and 10YR5/3
	Stone	:	Slightly stony (6-15%) or occasionally moderately stony (16-35%) small subangular flints.
	Structure	:	cultivation zone, not applicable
	Calcareous	:	non-calcareous
	Roots	:	common fine and very fine
	Boundary	:	smooth, abrupt
Subsoil	Depth	:	27/30 cm - 120 cm
	Texture	:	medium clay loam or sandy clay loam
	Colour	:	10YR5/3
	Stone	:	highly variable - very slightly (1-5%) to moderately stony (16-35%) small subangular flint.
	Structure	:	too stony to assess
	Porosity	:	less than 0.5%
	Consistence	:	very firm
	Roots	:	common fine and very fine
	Calcareous	:	non-calcareous
	Other	:	assessed as wetness class I.

SOIL TYPE 2

Topsoil	Depth	:	0-28/35 cm
	Texture	:	heavy clay loam, or occasionally medium clay loam.
	Colour	:	10YR4/2
	Stone	:	very slightly stony (1-5%) small subangular flints.
	Structure	:	cultivation zone, not applicable
	Calcareous	:	non-calcareous
	Roots	:	common fine and very fine
	Boundary	:	abrupt, smooth
Subsoil	Depth	:	120 cm
	Texture	:	clay
	Colour	:	10YR6/3
	Mottling	:	common distinct ochreous mottles 10YR5/8
	Stone	:	none
	Structure	:	weakly developed, very coarse subangular blocky.
	Calcareous	:	occasionally calcareous below 70 cm
	Porosity	:	less than 0.5%
	Consistence	:	very firm
	Roots	:	common fine and very fine to 60 cm, few below 60 cm.
	Manganese concretions	:	common
	Other	:	wetness class IV

Note: There are occasional thin bands of heavy clay loam upper subsoil overlying the main unit of clay subsoil.