AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS.
HILL FARM, WILLINGTON, DERBYSHIRE

1.0 BACKGROUND

1.1 The site covers an area of 29.6 ha near Willington, Derbyshire and is the subject of an application for gravel extraction.

1.2 ADAS Statutory Resource Planning Team undertook a detailed Agricultural Land Classification (ALC) and soil physical characteristics survey of the site during February 1995. Information was collected from auger borings, spaced at 100 m intervals, to a depth of 120 cm or shallower if an impenetrable layer was encountered near the surface. Subsoil conditions were assessed from two inspection pits and supplementary auger borings were carried out to confirm the boundaries of soil types.

1.3 On the published provisional 1:63 360 scale ALC map, sheet 120 (MAFF, 1972) the majority of the site is mapped as grade 2, with grade 3 land occurring in the northwest.

1.4 At the time of survey all of the land on site was under grass.

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

2.1 Climatic data for the site was extrapolated from data published in the Agricultural Climatic Dataset (Meteorological Office, 1989). This indicated that for an average site altitude of 48 m AOD the average annual rainfall is 635 mm (25.0"), while the accumulated temperature (ATO) is 1409 days °C. The field capacity days are 145 and moisture deficits for wheat and potatoes

are 105 mm and 96 mm respectively. These climatic characteristics do not impose any climatic limitation on the ALC grading of the site.

Altitude and Relief

2.2 The majority of the site comprises level land at an altitude of 48 m AOD. In the northwest corner the land rises gently to 55 m AOD with slopes measuring 3°. Gradient and altitude do not constitute limitations to the ALC grade.

Geology and Soils

2.3 The published 1:50 000 scale solid and drift edition geology map, sheet 141 (Geol. Survey 1976) shows the majority of the site to comprise river terrace gravels over Triassic Keuper Marl. Triassic Keuper Marl is exposed on the north western side of the site.

2.4 No detailed soil map exists for the area but the reconnaissance 1:250 000 scale maps "Soils of Midland and Western England" (Soil Survey of England and Wales 1983) shows the whole area to comprise the Arrow Association (*1). Detailed field survey work identified three soil types (*2).

(*1) Arrow Association - deep permeable coarse loamy soils affected by groundwater.

(*2) Due to the variation on site sporadic pockets, too small to map, of different soil types may occur within the mapped area of each soil type e.g. pockets of type 3 within the mapped area of type 1.

SOIL TYPE 1 (see Appendix 1 and the Soil Types Map)

2.5 Soil type 1 is gravelly and runs south from Longlands Plantation. Profiles typically comprise non calcareous, slightly stony, medium clay loam topsoils over gravel horizons which consist of 40% flints in a loamy medium sand matrix (from 30/35 cms). These soils have been assessed as wetness class III due to the effect of groundwater at moderate depths in the profile.

SOIL TYPE 2 (see Appendix 1 and the Soil Types Map)

2.6 Soil type 2 is deeper over the gravel and occupies two small pockets at the eastern and western boundaries of the site. Profiles typically comprise non calcareous, very slightly or slightly stony medium clay loam topsoils over slightly stony, medium sandy loam (or occasionally sandy clay loam) upper subsoils. At depth (45/55 cms) gravel horizons are encountered and consist of 40% flints in a loamy medium sand matrix. Profile wetness has been assessed as III due to the presence of groundwater at moderate depths in the subsoil.

SOIL TYPE 3 (see Appendix 1 and the Soil Types Map)

2.7 Soil type 3 occupies a broad band through the centre of the site. Soils are heavy in texture and typically comprise non calcareous very slightly or slightly stony medium clay loam (or occasionally heavy clay loam) topsoils over very slightly or slightly stony clay (or occasionally heavy clay loam/sandy clay loam) upper subsoils. Gravel horizons comprising 40% flints in a loamy medium sand matrix occur at depth 55/65 cms, or occasionally 90/100 cms. Infrequently gravel layers are not encountered within 120 cm depth. Gleying occurs at 30/35 cms resulting in a wetness class assessment of IV.

3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The breakdown of Agricultural Land Classification (ALC) grades in hectares and percentage terms is shown below.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
3a	8.9	30
3b	20.7	70
TOTAL	29.6	100.0

The definitions of the ALC grades is shown in Appendix 2.

Subgrade 3a

3.2 Land graded subgrade 3a occurs as two separate blocks and is associated with soil type 2 which is described in paragraph 2.6. The combination of light soil textures and gravel horizons at moderate depths in the profile reduces the available water for crop growth. Consequently moderate droughtiness imperfections restrict the land to grade 3a (good quality agricultural land).

Subgrade 3b

3.3 The majority of the site comprises subgrade 3b land and is associated with soil type 3 (see paragraph 2.7) and soil type 1 (see paragraph 2.5).

3.4 Where soil type 1 predominates the presence of gravel horizons directly below the topsoil significantly reduces the water retention capacity of this land. Consequently profiles are significantly droughty and precluded from a higher grade due to droughtiness restrictions.

3.5 Where soil type 3 predominates the presence of slowly permeable horizons directly below the topsoil (i.e. wetness class IV) combines with the heavy, non calcareous topsoils to impose a significant limitation on the flexibility of the land for cropping. As a result significant wetness and workability imperfections restrict the land to subgrade 3b (moderate quality agricultural land).

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REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN, (England and Wales) 1976. Solid and Drift Edition, Sheet 141. 1:50 000 scale.

MAFF, 1972. Agricultural Land Classification map Sheet 120. Provisional 1:63 360 scale.

MAFF, 1983. Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Agricultural Land). Alnwick.

METEOROLOGICAL OFFICE 1989. Published climatic data extracted from the agricultural dataset, compiled by the Meteorological Office.

SOIL SURVEY OF ENGLAND AND WALES 1983. Sheet 3, Midland and Western England 1:250 000 scale.

Appendix 1

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS
SOIL TYPE 1 :

Topsoil	Texture	:	medium clay loam
	Colour	:	10YR4/2
	Stone	:	10% small and medium flints
	Roots	:	many, fine medium and coarse
	Depth	:	30 cm
Upper Subsoil	Texture	:	loamy medium sand
	Matrix colour	:	10YR6/4, 10YR6/3 and 10YR6/6
	Stone	:	40% Flints
	Structure	:	)
	Consistence	:	) too stony to assess
	Porosity	:	)
	Depth	:	120 cm

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS
SOIL TYPE 2 :

Topsoil	Texture	:	medium clay loam
	Colour	:	10YR4/2
	Stone	:	5 - 10% small and medium flints
	Roots	:	many, fine medium and coarse
	Depth	:	30 cm
Upper Subsoil	Texture	:	medium sandy loam (or occasionally sandy clay loam)
	Matrix colour	:	10YR5/3, 10YR5/2 and 10YR5/4
	Stone	:	15% small and medium flints
	Structure	:	*moderately developed, coarse* subangular blocky breaking to medium angular blocky.
	Consistence	:	friable
	Porosity	:	> 0.5% biopores
	Depth	:	45/55 cms
Lower Subsoil	Texture	:	loamy medium sand
	Matrix colour	:	10YR6/4, 10YR6/3, 10YR6/6
	Stone	:	40% small and medium flints
	Structure	:	)
	Consistence	:	) too stony and wet to assess
	Porosity	:	)
	Roots	:	common, fine and very fine
	Depth	:	120 cm

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS
SOIL TYPE 3 :

Topsoil	Texture	:	medium clay loam (occasionally heavy clay loam).
	Colour	:	10YR3/1 and 10YR3/2
	Stone	:	5 - 10% small and medium flints
	Roots	:	many, fine and very fine
	Depth	:	30 cms
Upper Subsoil	Texture	:	clay (occasionally heavy clay loam or sandy clay loam).
	Matrix colour	:	10YR5/3 and 10YR5/1, 5YR5/1
	Stone	:	5 - 15%, small, medium and large rounded flints.
	Structure	:	moderately developed very coarse prismatic.
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	common, fine and very fine
	Depth	:	55/65 cms; or occasionally 90/100cms
Lower Subsoil	Texture	:	loamy medium sand (occasional. sandy clay lenses.
	Matrix colour	:	7.5YR5/8 and 10YR6/1
	Stone	:	40%, small, medium and large flints
	Structure	:	)
	Consistence	:	) too stony to assess
	Porosity	:	)
	Roots	:	common, fine and very fine
	Depth	:	120 cms

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.