AGRICULTURAL LAND CLASSIFICATION

AND SOIL PHYSICAL CHARACTERISTICS

FINNINGLEY QUARRY EXTENSION

NOTTS

1/18/92

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS

FINNINGLEY QUARRY EXTENSION, NOTTINGHAMSHIRE

1.0 BACKGROUND

1.1 The site, an area of 239.7 hectares, is the subject of an application, by Steetley Quarry Products, for the extraction of sand and gravel from land near Finningley, Notts. MAFF surveyed the site in April 1992 to assess the agricultural land quality and soil physical characteristics.

1.2 On the published Agricultural Land Classification (ALC) Map sheet number 103 (Provisional, scale 1:63360, MAFF 1969), the site is shown as grade 3. The current survey was undertaken to provide a more detailed ALC of the site.

1.3 Auger boring observations were supplemented by observations from 4 soil pits. At the time of survey the land was in cereals, short term grass and plough.

2.0 SITE PHYSICAL FACTORS

2.1 Climate data for the site was obtained from the published agricultural climatic dataset (Met Office, 1989). This indicates that the annual average rainfall for the site is 573 mm (22.6"). This data also shows that field capacity days are 111.

2.2 The accumulated temperature for this area is approximately 1420 Day degrees Celsius. This parameter indicates the cumulative build-up of warmth available for crop growth and in conjunction with rainfall has an influence on the development of soil moisture deficits (SMD)* and susceptibility to drought; soil moisture deficits of 114 mm and 107 mm are recorded for wheat and potatoes respectively.

* SMD represents the balance between rainfall and potential evapotranspiration occurring during the growing season. For ALC purposes the soil moisture deficits 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.

Altitude and Relief

2.4 The site comprises two areas adjacent to the existing Finningley Quarry workings. The larger area (approx 203 hectares in area) comprises a level, low-lying plateau of 5 m AOD which rises gently to 6 m at Misson Grange and falls slightly to the west towards the A614 road (4 m AOD).

2.5 The smaller site lying south of the quarry workings, east of Austerfield village, forms a low lying area of 4-5 m AOD which rises to the east and south to 5-6 m AOD.

2.6 Neither gradient nor altitude are limitations to the ALC grade.

3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The definitions of the Agricultural Land Classification (ALC) grades are included in Appendix 1.

3.2 The survey areas has been graded as mainly 3b with smaller areas of 2 and 3a. The table below shows the breakdown of ALC grades in hectares and percentage terms.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
2	24	10.0
3a	45.1	19
3b	169.8	70.5
Agricultural Buildings/ Non Agricultural	0.8	0.5
TOTAL	239.7	100

Grade 2

Two small but discrete areas of the site have been mapped as grade 2.

3.3 At the north western edge of the site organic low-lying land has been graded 2, the soils are fully described in paragraph 4.5 (Soil Type 4). Profile pit observations indicate that the marine clay subsoils are porous and freely draining due to the presence of a dense network of coarse interlinking reed channels. Due to the presence of heavy subsoil textures the water available for crop growth is slightly restricted. Consequently slight droughtiness constraints exclude the land from grade 1.

3.4 The second area of grade 2 has been mapped adjacent to Newington where deep coarse loamy soils over clay lower subsoils predominate (Soil Type 3, described in paragraph 4.4). The soil textures have a slight limiting effect on the profile moisture reserves for crop growth. As a result, minor droughtiness limitations restrict the land to grade 2 (very good quality agricultural land).

Subgrade 3a

Land graded 3a is associated with Soil Types 1 and 2.

3.5 To the south, adjacent to Newington the lighter textured variant of soil type 1 outcrops (described in paragraph 4.2). Profile pit observations indicated that the clayey subsoils are gleyed and slowly permeable directly below the topsoil (ie wetness class III). The fine loamy topsoils combine with profile wetness to impose moderate workability and wetness limitations which restrict the land to subgrade 3a (good quality agricultural land).

3.6 Along the eastern edge of the site in three areas, (ie adjacent to Highwood Farm, Misson Grange and Deeps Lane) the sandy soils present (Soil Type 2, see paragraph 4.3) have been graded 3a. The presence of sandy textures below 45/60 cms depth has a moderate limiting affect on the available reserves of profile water for crop growth. Consequently moderate droughtiness imperfections exclude the land from a higher grade.

Subgrade 3b

The majority of the site has been graded 3b in association mainly with Soil Type 1 (see paragraph 4.2) and to a lesser extent with a stonier or

lighter textured variant of Soil Type 2 (see paragraph 4.3).

3.7 The majority of the 3b land is associated with the clayey soils of Soil Type 1. The clayey subsoils are slowly permeable directly below the topsoil (ie wetness class III) and the topsoil textures are heavy and non calcareous. These three factors combine to impose a significant limitation on the agricultural potential of this land. Thus the land is restricted to subgrade 3b (moderate quality agricultural land).

3.8 Two small areas of 3b are associated with the more droughty variants of Soil Type 2.

3.9 South of Misson Grange and Deeps Lane topsoil stone content and/or sandy textures predominate which significantly restrict the quantities of available profile moisture for crop growth. Consequently the land is excluded from a higher grade.

Non Agricultural

3.10 A woodland and a vegetated derelict gravel pit appear as Non Agricultural.

4.0 SOIL PHYSICAL CHARACTERISTICS

4.1 The published 1:63360 scale drift edition geology sheet 88 (Doncaster, Geological Survey of England and Wales 1969) shows the larger site to comprise mainly Vale of York clay and silt with smaller outcrops of older river gravel and peat to the east and north west respectively. Bunter Sandstone underlies the river gravel deposits. The smaller area to the south adjacent to Newington, mainly comprises terrace gravels with older river gravels to the east; both deposits overlie Bunter Sandstone. The current detailed inspection of the site shows the four key soil types which are derived from the above deposits.

Soil Type 1 (refer to Appendix 2 and Soil Types Map)

4.2 The heavy textured soils derived from the Vale of York clays and silts cover the majority of the site and extend to 167.5 hectares. Topsoils are typically heavy clay loams or clays, although they may be lighter (eg medium clay loams) particularly to the south near Newington. Subsoils comprise clays which are non calcareous and slowly permeable.

Soil Type 2 (refer to Appendix 2 and Soil Types Map).

4.3 In association with the older river gravel deposits in the northern area lighter textured sandy soils predominate (48.2 hectares). Profiles typically comprise very slightly stony or slightly stony medium sandy loam topsoils over very slightly stony loamy medium sands or medium sandy loam upper subsoils. At depth profiles become sandier and generally less stony. In the vicinity of Misson Grange Farm (land previously worked) and Deeps Lane profiles are often stonier and topsoil textures lighter (eg loamy medium sands).

Soil Type 3 (refer to Appendix 2 and Soil Types Map)

4.4 In association with the gravel deposits at Newington light textured soils which overlie clays predominate (13.8 hectares). Soils typically comprise medium sandy loam or occasionally fine sandy loam topsoils over medium sandy loam or occasionally sandy clay loam upper subsoils. At depth clays which may contained bands of sand are present. Invariably the lower horizon is slowly permeable like the clay subsoil of Soil Type 1.

Soil Type 4 (refer to Appendix 2 and Soil Types Map)

4.5 At the north western edge of the site where peat has been mapped organic soils predominate (10.2 hectares). Profiles typically comprise organic clays or organic loam topsoils which overlie porous marine clays. At

depth interbedded lenses of porous clay loams, fine sand and medium sands predominate. Occasionally profiles are coarse textured throughout the subsoil but these occur too infrequently to delineate separately (ALC grade 1).

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S ESCOTT
Resource Planning Team
ADAS, Cambridge

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 yields 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 winter 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 level of yields. It is mainly suited to grass with occasional arable crops (eg cereal 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 very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX 2

SOIL PHYSICAL CHARACTERISTICS

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SOIL TYPE 1 (167.5 ha)

Topsoil	Texture	:	heavy clay loam or clay, occasionally medium clay loam.
	Depth	:	30 cm
Subsoil	Texture	:	clay
	Structure	:	moderately developed coarse and very coarse prisms.
	Consistence	:	very firm
	Depth	:	120 cm

SOIL TYPE 2 (48.2 ha)

Topsoil	Texture	:	medium sandy loam or occasionally loamy medium sand.
	Stone	:	3 to 10% flints, occasionally 20/25%
	Depth	:	30 cm, occasionally 40 cm
Upper Subsoil	Texture	:	medium sandy loam or loamy medium sand.
	Stone	:	3 to 5%; occasionally 20 to 25%$^{+}$
	Structure	:	moderately developed coarse subangular blocky or structureless.
	Consistence	:	friable or very friable (if loamy sand).
	Depth	:	50/60 cm, occasionally 45 cm
Lower Subsoil	Texture	:	loamy medium sand or sand
	Stone	:	typically 2 to 3%, occasionally 20 to 25%.
	Structure	:	structureless, single grain
	Depth	:	120 cm

SOIL TYPE 3 (13.8 ha)

Topsoil	Texture	:	medium sandy loam, occasionally fine sandy loam.
	Stone	:	1-2% flints
	Depth	:	30 cm
Upper Subsoil	Texture	:	medium sandy loam, occasionally sandy clay loam.
	Stone	:	1-2% flints; occasionally 5%
	Structure	:	moderately developed coarse subangular blocky.
	Consistence	:	friable
	Depth	:	60 cm, occasionally 70/80cm
Lower Subsoil	Texture	:	clay
	Structure	:	moderately developed coarse angular blocky.
	Consistence	:	very firm, gleyed
	Depth	:	120 cm

SOIL TYPE 4 (10.2 ha)

Topsoil	Texture	:	organic clay or organic loam
	Depth	:	30 cm
Upper Subsoil	Texture	:	porous marine clay; occasionally medium sandy loam.
	Structure	:	moderately developed very coarse angular blocky.
	Consistence	:	very firm, gleyed.
	Depth	:	60/70 cm
Lower Subsoil	Texture	:	interbedded lenses of medium sand, fine sand and clay loam.
	Structure	:	moderately developed coarse angular and subangular blocky, weaker where sand lenses predominate.
	Consistence	:	friable, firm where more clay loam lenses predominate.

Additional Information

Profiles are non calcareous throughout.

Rooting common in the upper horizons, few in lower subsoils.

Profiles freely draining (wetness class I) in Soil Types 2 and 4;
Wetness class I or II in Soil Type 3 and wetness class III in Soil Type 1.

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES 1969. Drift edition geology map 88 1:63,360 scale.

MAFF 1969. Agricultural Land Classification Map 103, 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. Climate data extracted from the published agricultural climatic dataset.

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MAP 1 : AGRICULTURAL LAND CLASSIFICATION

MAP 2 : SOIL TYPES