FRCA

[redacted]

FARMING AND RURAL CONSERVATION AGENCY

An Executive Agency of the Ministry of Agriculture, Fisheries and Food and the Welsh Office

TYTTENHANGER EAST QUARRY EXTENSION, HERTFORDSHIRE
Agricultural Land Classification and Soil Resource Report, Validation Survey
September 1997

Resource Planning Team
Eastern Region
FRCA Cambridge

RPT Job Number: 26/97
MAFF Reference: EL18/02034
LURET Job Number: ME3R75D

AGRICULTURAL LAND CLASSIFICATION AND SOIL RESOURCES REPORT VALIDATION SURVEY

Tyttenhanger East Quarry Extension, Hertfordshire

INTRODUCTION

1. This report presents the findings of a detailed, Agricultural Land Classification (ALC) validation survey of 98.8 ha of land located at Tyttenhanger in Hertfordshire. The survey was carried out during July 1997.

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 an application by Redland Aggregates to extend the existing Tyttenhanger Quarry. The area was surveyed to confirm the consultant's ALC grading and soil resource mapping. MAFF surveyed adjacent land to the north in 1995 (FRCA job No.131/95), this indicated that the land was predominantly grade 2, with smaller areas of grade 1 and 3a.

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). This survey supersedes previous ALC information for this site. A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of survey, the agricultural land was under linseed, cereals, maize or grass. The unsurveyed land comprises old gravel workings. Irrigation may have been a practise, on part of the site, in the past.

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)	% surveyed area	% site area
1	14.4	18.1	14.6
2	27.5	34.6	27.9
3a	3.0	3.8	3.0
3b	32.7	41.2	33.1
3b (disturbed)	1.8	2.3	1.8
Other land	19.4	N/A	19.6
Total surveyed area	79.4	100	-
Total site area	98.8	-	100

7. The fieldwork was conducted at an average density of 1 auger boring per hectare. A total of 81 auger borings and 4 soil pits was described.

8. Most of the site comprises best and most versatile land (grades 1, 2 and 3a). Land graded 1 (excellent quality agricultural land) has no limitations. The depth to gravel imposes a slight or moderate droughtiness limitation which restricts the remainder of this land to grade 2 (very good quality agricultural land) or 3a (good quality agricultural land). Occasionally profiles are slowly permeable at depth and limited to grade 2 by slight wetness/workability constraints.

9. Large areas of land graded 3b (moderate quality agricultural land) occur, with a smaller area of worked land graded 3b (disturbed) north of Coursers Road. This land is limited by significant droughtiness constraints caused by the relatively shallow depths of soil over the gravel.

FACTORS INFLUENCING ALC GRADE

Climate

10. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

11. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	TL 201 040
Altitude	m, AOD	75
Accumulated Temperature	day°C (Jan-June)	1412
Average Annual Rainfall	mm	658
Field Capacity Days	days	138
Moisture Deficit, Wheat	mm	111
Moisture Deficit, Potatoes	mm	104
Overall climatic grade	N/A	1

12. 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.

13. 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 (ATO, January to June), as a measure of the relative warmth of a locality.

14. The combination of rainfall and temperature at this site mean there is no overriding climatic limitation to the land (i.e. grade 1).

Site

15. The site occupies level or gently sloping land (typically 75mAOD) south of Coursers Road. Relief and slope do not impose a limitation to the agricultural quality of this land.

Geology and soils

16. At a scale of 1:50 000 the geology sheet 239 (Geological Survey of Great Britain [England and Wales], 1978) shows the whole site to be underlain by Upper Chalk. Over most of the area this is covered by glacial gravel (with bunter pebbles) and adjacent to the River Colne (the non agricultural area) by narrow bands of alluvium and Taplow gravel.

17. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales, (Sheet 4, Soils of Eastern England, 1983) shows three soil associations. The Hamble 2 Association covers most of the site. East of this is an area of the Gresham Association, whilst along the southern edge the Marlow Association is mapped.

These soils are described briefly as:-

- Hamble 2: Deep stoneless well drained silty soils and similar soils affected by groundwater over gravel locally. Usually flat land.
- Gresham: Stoneless slowly permeable seasonally waterlogged coarse loamy soils and silty over clayey soils. Some deep coarse loamy soils affected by groundwater.
- Marlow: Well drained fine loamy over clayey and clayey soils. Some coarse and fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

18. In the present survey three main soil types were identified. A detailed description of the three soil profiles is presented in Appendix II. The soil resources (types I, II, II* & III) are shown on the attached soil resources map. Also included in this appendix is a soil resources schedule which describes these soils when they are mapped separately as topsoils and subsoils (prepared during discussions on restoration with the consultant). These maps are also shown in Appendix II.

Soil Type I

19. Approximately a third of the site comprises shallow soils over gravel deposits. Profiles typically consist of slightly stony medium sandy silt loam or medium sandy loam topsoils over gravel. The gravel comprises 70% stones in a loamy medium sand or medium sand matrix. Often there is a thin layer of moderately stony medium sandy loam above the gravel to 40/55cms.

Soil type II (& II)*

20. Profiles are silty and typically comprise very slightly stony medium silty clay loam topsoils over deep, similar subsoils. At depth (80/90cms+) profiles may overlie gravel (mapped as type II*) which comprises 70% stones in a loamy medium sand or medium sand

matrix. Occasionally profiles overlie heavy silty clay loams at depth which are slowly permeable (sporadic within type II* area).

Soil type III

21. In the north east corner of the site a very small area of moderately deep soils over gravel occurs. Profiles typically comprise very slightly stony medium silty clay loam, or occasionally sandy clay loam or medium sandy loam topsoils over similar textured but stonier upper subsoils. Below 50/60 cms profiles tend to merge into gravel deposits (70% stones in a loamy medium sand or medium sand matrix).

AGRICULTURAL LAND CLASSIFICATION

22. 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.

Grade 1

23. Land graded 1 occupies part of the centre of the site and is associated with the deep silty soils described in paragraph 20 (soil type II). The presence of deep well bodied soils and few stones mean that high reserves of water are available for crop growth. Consequently the land has no limitations and has been graded 1 (excellent quality agricultural land).

Grade 2

24. Through the west of the site land has been graded 2. In this area the silty soils (described in paragraph 20 [soil type II*]) overlie gravel horizons or occasionally become heavier and slowly permeable at depth. In the former, the presence of gravel, slightly reduces the profile available water for crop growth, consequently the land is precluded from a higher grade. Sporadically, where slowly permeable horizons are encountered, the wetness class has been assessed as II. This combines with the fine topsoil textures to impose a minor wetness/workability limitation. As a result the land is restricted to grade 2 (very good quality agricultural land).

Subgrade 3a

25. In the north east corner of the site a very small area of moderately deep soils over gravel (described in paragraph 21) has been graded 3a. The presence of the gravel below 50/60 cms depth combines with the soil textures to make the soils droughty, particularly for deeper rooting crops, such as cereals. Consequently moderate droughtiness imperfections preclude the land from a higher grade.

Subgrade 3b

26. Approximately a third of the site comprises shallow soils over gravel deposits which are described in paragraph 19. The presence of many stones, particularly below the topsoil (typically in the form of gravel horizons) significantly reduces the available water reserves. As a result the land is significantly droughty and limited to grade 3b (moderate quality agricultural land). A disturbed area, to the north, corresponds to land which was worked for gravel in the 1980's.

Sarah Escott
Resource Planning Team
Eastern Region
FRCA Cambridge

SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales), 1978, *sheet 239, Hertford.* 1:50 000 scale.

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 4, Soils of Eastern England,* 1:250 000 scale, 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 I

Topsoil	Texture	medium sandy silt loam or medium sandy loam
	Colour	10YR 4/2, 3/2
	Stone content	10-15% (c. 10% >2cms diameter) flints
	Roots	many fine and very fine
	Calcium carbonate	non
	Boundary form	abrupt smooth
	Depth	30/32cms
Upper subsoil (where exists)	Texture	medium sandy loam
	Colour	10YR5/4
	Stone content	16-25% flints
	Structure	weakly developed coarse and medium subangular blocky
	Consistence	very friable
	Porosity	>0.5% biopores
	Roots	many fine and very fine
	Calcium carbonate	non
	Concretions	none
	Boundary form	abrupt smooth
	Depth	40/55cms

Gravel horizon (30/55cms+): comprises 70% stones in a medium sand or loamy medium sand matrix

Notes:

wetness class: I
gravel is rootable

SOIL TYPE II and II*

Topsoil	Texture	medium silty clay loam
	Colour	10YR4/2
	Stone content	2-5% flints
	Roots	common medium, many fine and very fine
	Calcium carbonate	non
	Boundary form	abrupt smooth
	Depth	30/35cms
Upper subsoil	Texture	medium silty clay loam
	Colour	7.5YR4/3, 5/4
	Stone content	<5% flints
	Structure	moderately developed coarse and very coarse angular blocky
	Consistence	very friable/friable
	Porosity	>0.5% biopores
	Roots	many fine and very fine
	Calcium carbonate	non
	Concretions	none
	Boundary form	abrupt smooth
	Depth	120cms (II) or 80/90cms (II*), occasionally 55/65cms (II*)
Lower subsoil (typically type II*)	Texture	gravel* (80/90cms+) or occasionally heavy silty clay loam or occ. silty clay (55/65cms+)
	Colour	10YR5/3
	Stoniness	up to 10% flints
	Mottles	many 7.5YR5/6
	Structure	moderately developed coarse ans very coarse angular blocky
	Consistence	firm/very firm
	Porosity	<0.5% biopores
	Roots	common
	Calcium carbonate	non
	Concretions	none
	Depth	120cms

* Gravel horizon (80/90cms+): comprises 70% stones in a medium sand or loamy medium sand matrix

Notes:

wetness class: I, occasionally II where slowly permeable 55/65cms+
gravel is rootable

SOIL TYPE III

Topsoil	Texture	medium silty clay loam or occasionally medium sandy loam/sandy clay loam
	Colour	10YR3/2
	Stone content	<5% flints
	Roots	many fine and very fine
	Calcium carbonate	non
	Boundary form	abrupt smooth
	Depth	30/32cms
Upper subsoil	Texture	medium sandy loam or medium silty clay loam
	Colour	10YR5/4
	Stone content	10% flints
	Structure	weakly developed coarse and medium subangular blocky
	Consistence	friable
	Porosity	>0.5% biopores
	Roots	many fine and very fine
	Calcium carbonate	non
	Concretions	none
	Boundary form	abrupt smooth
	Depth	50/60cms, typically 60cms

Gravel horizon (50/60cms+): comprises 70% stones in a medium sand or loamy medium sand matrix

Notes: wetness class: I

APPENDIX II (continued)

TYTTENHANGER EAST QUARRY EXTENSION, HERTS

SOIL RESOURCES SCHEDULE (refer to topsoil and subsoil resource maps)

TOPSOILS (0-30cms)

T1: very slightly stony MZCL
T2: slightly stony MSZL or MSL (occ very slightly stony MZCL or SCL)

SUBSOILS (30-120cms*)

S1: very slightly stony MZCL (occ slightly stony MSL or MZCL)
S2: very slightly stony MZCL, or occ. HZCL, ZC, may overlie gravel 80/90cms+
S3: gravel (often thin layer of moderately stony MSL above gravel to 40/55cms)

* Where subsoils comprise an upper and lower subsoil component (see topsoil/subsoil resource maps) the typical cutoff depth between the two is 60cms (from the land surface).

The soil profiles typically extend to 120cms depth.

Abbreviations

MZCL: medium silty clay loam
MSZL: medium sandy silt loam
MSL: medium sandy loam
SCL: sandy clay loam
HZCL: heavy silty clay loam
ZC: silty clay
occ: occasional
gravel: 70% stones in loamy medium sand or medium sand matrix