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FARMING AND RURAL CONSERVATION AGENCY

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

KINGS STREET, NR GREATFORD, LINCOLNSHIRE.

VALIDATION SURVEY
Agricultural Land Classification and Soil *Physical Charateristics Report.*
September 1997

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VALIDATION SURVEY
AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARATERISTICS REPORT

Kings Street, Nr Greatford, Lincolnshire

INTRODUCTION

1. This report presents the findings of a semi-detailed, Agricultural Land Classification (ALC) validation survey of 42.6ha of land at Kings Street, Nr Greatford, Lincolnshire. The survey was carried out during August 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 Ennemix Limited to extract sand and gravel from the site before restoration to wetland areas. The site was surveyed to confirm the grading and soil resource mapping produced on behalf of the applicant by Reading Agricultural Consultants

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 on site was either ploughed or under an onion crop. The other land comprised plantations of small trees and a barn with a concrete hard standing area.

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
3b	40.9	100	96
Other land	1.7	N/A	4
Total site area	42.6	100	100

7. The fieldwork was conducted at an average density of 0.5 auger borings per hectare. A total of 21 auger borings and 2 soil pits was described.

8. The whole site has been graded 3b (moderate quality agricultural land) due to a significant droughtiness limitation. The very slightly to slightly stony fine loamy topsoils and moderately to very stony coarse loamy sub-soils have a relatively low water holding capacity. This, combined with the high soil moisture deficits expected in this area, imposes a significant drought risk, which restricts the land to sub-grade 3b.

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 5km grid datasets using the standard interpolation procedures (Met. Office, 1989

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	TF 101 121
Altitude	m, AOD	10
Accumulated Temperature	day°C (Jan-June)	1441
Average Annual Rainfall	mm	576
Field Capacity Days	days	108
Moisture Deficit, Wheat	mm	119
Moisture Deficit, Potatoes	mm	115
Overall climatic grade	N/A	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 mean there are no overriding climatic limitations to the land. It is therefore of climatic grade 1.

Site

14. The site is essentially level and has an average altitude of 10m AOD. To the east the site abuts Kings Street and to the north-west Greatford Road. At both these extremities, plantations of small trees separate the agricultural land from the roads. The north-east and south-west boundaries abut open fields.

Geology and soils

15. At a scale of 1:50 000 the geology sheet 157 (Geological Survey of Great Britain [England and Wales], 1978) maps the entire site as Fen and Terrace Gravel over Oxford Clay.

16. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales, (Sheet 4, Soils of Eastern England, 1983) maps the site as the Badsey 2 Association, described briefly as: well drained calcareous fine loamy soils over limestone gravel. Some similar soils affected by groundwater.

17. The present survey confirmed the presence of a single soil type.

18. The topsoil is predominantly comprised of very slightly to slightly stony (5-10%) medium clay loam (occ. heavy clay loam or sandy clay loam) extending to 30cm depth. The upper sub-soil is slightly (occasionally moderately) stony, medium/heavy clay loam and extends to 40/45cm. Lower sub-soils are typically loamy medium sand (occ. sandy clay loam or medium sand) and very stony, usually becoming impenetrable to the auger at 60/80 cm depth. One of the two soil inspection pits identified a carbonate cemented layer. The upper surface of this layer was at 65/70cm, and formed an impenetrable barrier to crop roots. The soils are calcareous throughout, due to their limestone origin.

19. 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.

20. The location of the auger borings and pits is shown on the attached sample location map and the soil physical characteristics data are presented in Appendix II

AGRICULTURAL LAND CLASSIFICATION

Subgrade 3b

21. The entire site has been graded 3b (moderate quality agricultural land) due to a significant droughtiness limitation associated with the soils described in paragraph 18. The fine loamy over coarse loamy profiles and the profile stone content mean the soil has limited water holding capacity. In this area, where expected soil moisture deficits are high, such droughty soils represent a significant drought risk. This land is therefore restricted to sub-grade 3b. Within the site, less droughty profiles (where the very stony sub-soils are encountered at greater depth) of subgrade 3a were identified. These however occurred sporadically and at the scale of this survey can not be delineated separately. Also, our field work suggests that the depth to gravel varies considerably over short distances.

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SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales), 1978, *sheet 157, Stamford.* 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.

Soil Survey of England and Wales (1984) *Soils and their Use in South East 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

Topsoil	Texture	medium clay loam (occ. heavy clay loam or sandy clay loam)
	Colour	2.5Y 4/3, 10YR 4/3
	Stone content	typically 5-10% small limestone fragments and flints
	Roots	many very fine and fine roots
	Calcium carbonate	very calcareous
	Boundary form	smooth, abrupt
	Depth	30cm
Upper subsoil *	Texture	medium or heavy clay loam (occ. sandy clay loam)
	Colour	10YR & 2.5Y 5/4 & 4/4. (occ. 10YR 5/6)
	Stone content	typically 5/15% (occ. 25/30%) small limestone fragments and flints
	Structure	weakly/moderately developed medium and coarse sub angular blocky
	Consistence	friable
	Porosity	>0.5% pores >0.5mm
	Roots	many very fine and fine
	Calcium carbonate	very calcareous
	Concretions	none
	Boundary form	smooth, abrupt/clear
	Depth	40/45cm
Lower subsoil	Texture	loamy medium sand (occ. medium sand or sandy clay loam)
	Colour	10YR 5/6, 6/4, 6/6, (occ. 2.5Y 6/4 or 6/6)
	Stoniness	typically 50-60% small limestone fragments and flints
	Structure	too stony to assess
	Consistence	too stony to assess
	Porosity	>0.5% pores >0.5mm
	Roots	few very fine and fine. (carbonate cemented layer starting at 60/70cm stops rooting in places)
	Calcium carbonate	very calcareous
	Concretions	none
	Depth	120cm

Notes: Profiles are typically assessed as Wetness Class I.
Profiles are typically impenetrable to auger at 60/80cm depth.

* Occasionally the upper sub-soil is absent (i.e. the topsoil directly overlies a very stony subsoil)
Both sub-soil horizons are variable across the site.