

**LAND AT WAKERLEY,  
NORTHAMPTONSHIRE**

**Agricultural Land Classification  
& Statement of Soil Physical  
Characteristics  
Maps and Report**

**January 1998**

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**RPT Job Number: 83/97  
MAFF Reference: EL29/2654  
FRCA Job No.: ME3W857**

# **AGRICULTURAL LAND CLASSIFICATION REPORT & STATEMENT OF SOIL PHYSICAL CHARACTERISTICS**

## **LAND AT WAKERLEY, NORTHAMPTONSHIRE**

### **INTRODUCTION**

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 151.1 ha of land southwest of Wakerley, Northamptonshire which lies on southern slopes of the River Welland valley. The survey was carried out during December 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 for determination of modern conditions for a mineral site pursuant to the Environmental Act 1995. This survey supersedes previous ALC information for this land.
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). A description of the ALC grades and subgrades is given in Appendix I.
4. At the time of survey the agricultural land use on the site was mainly growing winter cereals with some cereal stubbles and grass present. The areas mapped as 'Other land' comprise areas of concrete related to a disused airfield which covers part of the site and areas of scrub. In the west of the site an area of agricultural land has been left unsurveyed as this land has been worked for minerals and the soil then reinstated. This land is now undergoing a statutory aftercare period to allow physical conditions to stabilise and has therefore not been graded.

### **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 overleaf.
7. The fieldwork was conducted at an average density of one boring per hectare. A total of 125 borings and 8 soil pits was described.
8. Three areas of land at the site have been graded 3a (good quality agricultural land) due to moderate droughtiness limitations. The majority of the land has been graded 3b (moderate quality agricultural land) predominantly due to significant droughtiness limitations. Elsewhere wetness and workability imperfections limit land to subgrade 3b.

**Table 1: Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	26.8	22	18
3b	94.8	78	63
Agricultural land not surveyed	25.8	N/A	17
Other land	3.7	N/A	2
Total surveyed area	121.6	100	80
Total site area	151.1	-	100

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

**Table 2: Climatic and altitude data**

Factor	Units	Values
Grid reference	N/A	SP 947986
Altitude	m, AOD	85
Accumulated Temperature	day°C (Jan-June)	1366
Average Annual Rainfall	mm	647
Field Capacity Days	days	133
Moisture Deficit, Wheat	mm	106
Moisture Deficit, Potatoes	mm	96
Overall climatic grade	N/A	Grade 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 it is relatively warm and dry. Therefore, the climatic grade for this site has been assessed as 1.

## Site

14. The site occupies undulating land on the southern side of the River Welland valley and slopes in a northerly direction from high ground on a plateau in the south of the site. The site ranges in altitude from 65 m AOD in the north, to 100 m AOD in the southwest. Gradients were not found to be greater than 7°. Therefore, neither gradient nor altitude constitute a limitation to the ALC grade.

## Geology and soils

15. The published 1:50 000 scale geology map, sheet 157, Stamford, (Geological Survey of Great Britain, 1978) shows the site to mainly comprise Lower Lincolnshire Limestone (decalcified sandy limestone). Along the southeast boundary of the site a thin band of Upper Estuarine Series is mapped, while along the southwestern boundary a thin band of glacial boulder clay is shown. Finally, in the west of the site an area of Northampton Sand (Ironstone) is mapped, which has been opencasted.

16. On the 1:250 000 reconnaissance scale published soils map, sheet 4, Soils of Eastern England (Soil Survey of England and Wales, 1983) the majority of the site is shown as the Elmton 1 Association which is briefly described as shallow well drained brashy calcareous fine loamy soils over limestone. Some similar deeper soils and some non-calcareous and calcareous clayey soils. In the southwest of the site a small area of Ragdale Association soils is mapped. These soils are briefly described as slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils. Some slowly permeable calcareous clayey soils especially on slopes. Along the remainder of the southern boundary Evesham 1 Association is mapped which is briefly described as slowly permeable calcareous clayey soils associated with shallow well drained brashy calcareous soils over limestone.

17. During this survey a more detailed inspection of the soils was carried out and three soil types were also identified, the distribution of these is shown on the accompanying soil resources map. It should be noted that Soil Types I and II are very variable. Therefore the soil resources map is not necessarily a soil stripping map but illustrative of the soil resources available for restoration at the site.

### *Soil Type I (26.8 hectares)*

18. This Soil Type occurs in three areas in the north of the site and represents the deepest soils over hard limestone. Profiles typically comprise very slightly to slightly stony medium clay loam or fine sandy loam topsoils, over variably stony (typically very slightly stony) fine sandy loam, medium or heavy clay loam upper subsoils. Lower subsoils are very variable and typically comprise medium and heavy clay loam, clay, sandy clay loam or soft weathered limestone (textured as loamy fine sand or loamy medium sand). Stone content in this horizon is variable and ranges from very slightly to extremely stony, although typically it is very slightly to slightly stony. Below 60 cm hard limestone rock may be encountered which can have up to 20% soil inclusions. Roots generally do not effectively penetrate more than 20 cm into this material. These soils are typically free draining throughout.

### *Soil Type II (85.0 hectares)*

19. The majority of the site consists of Soil Type II and represents shallower soils over hard limestone (30/60 cm). Soils typically comprise slightly or moderately stony medium clay loam or occasionally heavy clay loam or fine sandy loam topsoils, over very slightly to moderately stony heavy and medium clay loam or soft weathered limestone (textured as loamy coarse sand, loamy medium sand or coarse sand) upper subsoils. Lower subsoils are often absent and below the soil material hard limestone rock is encountered which can have up to 20% soil inclusions. Roots generally do not effectively penetrate more than 20 cm into this material. Where lower subsoils are present they typically comprise moderately to very stony soft weathered limestone (same textures as above), medium or heavy clay loam or occasionally fine sandy loam or clay. Soil material does not typically extend below 60 cm depth. Profiles are typically free draining throughout.

### *Soil Type III (9.8 hectares)*

20. Along the southern boundary of the site are small areas of Soil Type III. Profiles typically comprise heavy clay loam or occasionally clay topsoils overlying slowly permeable clay subsoils. These soils are generally poorly drained, very slightly or slightly stony and variably calcareous, although never calcareous throughout.

## **AGRICULTURAL LAND CLASSIFICATION**

21. 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 2.

22. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

### **Subgrade 3a**

23. Three areas of land in the north of the site have been graded 3a. This land occurs in conjunction with the free draining (wetness class I) typically deeper fine and coarse loamy soils described in paragraph 18 (Soil Type I) which may encounter limestone at depth. Profile textures and stoniness result in the soils having moderate reserves of water available for plant growth and as a result there is a moderate droughtiness limitation to land quality and the land is graded 3a.

24. Although individual profiles of better and poorer grades were occasionally noted within the above mapping unit, they occurred too randomly or inextensively to permit separate delineation at the scale shown.

### **Subgrade 3b**

25. The majority of the site has been graded 3b and this land occurs in association with the free-draining (wetness class I), shallow soils over limestone described in paragraph 19 (Soil Type II). In addition to being shallow (often lower subsoils are absent, typically soil material does not extend below 60 cm) these soils are generally more stony and therefore they are less

moisture retentive. This results in a significant limitation on the potential for water retention in these soils and consequently droughtiness imperfections restrict this land to subgrade 3b.

26. Although individual profiles of better and poorer grades were occasionally noted within the above mapping unit, they occurred too randomly or inextensively to permit separate delineation at the scale shown.

27. In small areas along the southern boundary of the site land graded 3b corresponds with the poorly drained clayey soils described in paragraph 20 (Soil Type III). These soils are poorly drained and have been assessed as wetness class IV. This factor combines with the fine loamy or clayey topsoil textures to limit land quality to subgrade 3b due to significant wetness and workability constraints.

**Soil resources**

28. Three soil types have been identified within the site and their distribution is shown on the accompanying soil resources map which is illustrative of the soil resources within the site for restoration purposes but is not a soil stripping map for the site. A statement of the physical characteristics of Soil Types I, II and III is given in Appendix II. The thickness and the volume of the Soil Types is given below. It should be noted that Soil Types I and II are very variable and therefore thicknesses and volumes for these units should be treated with caution.

**Table 3: Soil Resources**

		Area (ha)	Thickness (cm)	Volume (m <sup>3</sup> )
Soil Type I	Topsoil	26.8	28	75,040
	Upper Subsoil	26.8	22	58,960
	Lower Subsoil	26.8	20	53,600
Soil Type II	Topsoil	85.0	25	212,500
	Upper Subsoil	85.0	15	127,500
	Lower Subsoil	Very variable, often absent.		
Soil Type III	Topsoil	9.8	25	24,500
	Subsoil	9.8	95	93,100

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## SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales) (1978) *Sheet No.157, Stamford, solid and drift edition, scale 1:50 000.*

BGS: London.

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, scale 1:250 000.*

SSEW: Harpenden.

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

#### SOIL TYPE I (26.8 hectares)

Topsoil	Texture	: Medium clay loam or fine sandy loam
	Colour	: 10 YR 4/3 brown or occasionally 10 YR 4/4 dark yellowish brown
	Depth	: Typically 28 cm, range 20 to 30 cm
	Stoniness	: Typically 5-10%, range very slightly to slightly stony (1-15%)*
	Roots	: Common, fine and very fine
	Calcium carbonate	: Variably calcareous. Typically, calcareous or slightly calcareous, range non-calcareous to very calcareous
	Boundary form	: Sharp, smooth
Upper subsoil	Texture	: Fine sandy loam, medium or heavy clay loam
	Colour	: 10 YR 5/6, 5/5 & 5/4 yellowish brown, 7.5 YR 5/6, 5/5 & 5/4 light olive brown or 10 YR 4/6 & 4/5 dark yellowish brown
	Depth	: Typically 50 cm, range 40 to 80 cm,
	Stoniness	: Variable. Typically 1-5%, range very slightly to moderately stony (1-20%)*
	Structure	: Moderately developed coarse and very coarse subangular blocky
	Consistence	: Friable
	Structural condition	: Moderate
	Porosity	: >0.5%
	Roots	: Common, very fine
	Calcium carbonate	: Variably calcareous. Typically calcareous or very calcareous, range non-calcareous to very calcareous
	Boundary form	: Abrupt, wavy
Lower subsoil	Texture	: Medium and heavy clay loam, clay, sandy clay loam or soft weathered limestone (textured as loamy fine sand or loamy medium sand)
	Colour	: 10 YR 5/6, 5/5 & 5/4 yellowish brown, 10 YR 6/8 & 6/6 brownish yellow or 10 YR 5/3 brown
	Depth	: Typically deeper than 70 cm**, range 60 to 120 cm+
	Stoniness	: Typically 1-10%, range very slightly to extremely stony (2-75%)*
	Structure	: Too stony to assess
	Consistence	: Too stony to assess
	Structural condition	: Too stony to assess
Porosity	: >0.5%	

Roots : Few, very fine. Where 80%+ hard limestones  
very few, very fine\*\*

Calcium carbonate : Typically very calcareous, range non-calcareous  
to very calcareous

Wetness Class: I

\*All stones within the profile are hard limestones.

\*\*Below the lower subsoil hard limestone rock is encountered which can have up to 20% soil inclusions, roots do not penetrate effectively further than 20 cm into this.

## SOIL TYPE II (85.0 hectares)

Topsoil	Texture	: Medium clay loam or occasionally heavy clay loam or fine sandy loam
	Colour	: 10 YR 4/3 brown or occasionally 10 YR 4/4 dark yellowish brown
	Depth	: Typically 25/30 cm, range 20 to 30 cm
	Stoniness	: Typically 8-20%, range very slightly to moderately stony (2-25%)*
	Roots	: Many or occasionally common, fine and very fine
	Calcium carbonate	: Variably calcareous. Typically very calcareous or calcareous, range non-calcareous to very calcareous
	Boundary form	: Abrupt, wavy or occasionally irregular or smooth
Upper subsoil**	Texture	: Heavy and medium clay loam or soft weathered limestone (loamy coarse sand, loamy medium sand or coarse sand)
	Colour	: 10 YR 5/4, 5/5 & 5/6 yellowish brown, 10 YR 4/5, 4/4 & 4/6 dark yellowish brown, 7.5 YR 5/6 & 4/6 strong brown or where weathered soft limestone predominates 10 YR 8/2, 7/3 & 8/3 very pale brown
	Depth	: Typically 40 cm, range 30 to 60 cm**
	Stoniness	: Typically 3-30%, range very slightly to extremely stony (1-75%)*
	Structure	: Moderately developed medium and coarse subangular blocky, often too stony to assess
	Consistence	: Friable or firm
	Structural condition	: Moderate
	Porosity	: Variable
	Roots	: Typically common, range few to many, fine and very fine**
	Calcium carbonate	: Typically very calcareous, range non-calcareous to very calcareous
	Boundary form	: Abrupt or clear, wavy or irregular
Lower subsoil	This horizon is often absent and below the soil material hard limestone rock is encountered which can have up to 20% soil inclusions. Roots generally do not effectively penetrate more than 20 cm into this material.	
	Where the lower subsoil is present it comprises:	
	Texture	: Soft weathered limestone (textured as loamy coarse sand, loamy medium sand or coarse sand), medium or heavy clay loam, or occasionally fine sandy loam or clay
	Colour	: 10 YR 5/6, 5/5 & 5/4 yellowish brown, 10 YR 7/6 & 7/8 yellow, 10 YR 7/4, 7/3 & 8/2 very pale brown or 7.5 YR 5/6 strong brown

Depth	:	Does not extend below 60 cm**
Stoniness	:	Typically 20-50%, range very slightly to extremely stony (30-75%)*
Structure	:	Too stony to assess
Consistence	:	Too stony to assess
Structural condition	:	Too stony to assess
Porosity	:	Too stony to assess
Roots	:	Few, very fine. Where 80%+ hard limestones very few, very fine **
Calcium carbonate	:	Typically very calcareous

Wetness Class: I

\*All stones within the profile are hard limestones.

\*\*Below the upper or lower subsoil hard limestone rock is encountered which can have up to 20% soil inclusions, roots do not penetrate effectively further than 20 cm into this.

### **SOIL TYPE III (9.8 hectares)**

<b>Topsoil</b>	<b>Texture</b>	: Heavy clay loam or occasionally clay
	<b>Colour</b>	: 10 YR 4/3 brown
	<b>Depth</b>	: Typically 25 cm, range 20 to 35 cm
	<b>Stoniness</b>	: Typically 1-4%, range very slightly to slightly stony (1-10% hard limestones)
	<b>Roots</b>	: Common, fine and very fine
	<b>Calcium carbonate</b>	: Variably calcareous. Typically non-calcareous, range non-calcareous to very calcareous
	<b>Boundary form</b>	: Abrupt, smooth
<b>Subsoil</b>	<b>Texture</b>	: Clay
	<b>Colour</b>	: 10 YR 5/3 brown, 2.5 Y 5/4, 5/3 & 5/5 light olive brown or 10 YR 5/4 yellowish brown
	<b>Depth</b>	: 120 cm +
	<b>Stoniness</b>	: Typically 1-5 %, range very slightly to slightly stony (1-8% hard limestones and chalk)
	<b>Structure</b>	: Moderately developed coarse angular blocky
	<b>Consistence</b>	: Firm
	<b>Structural condition</b>	: Poor
	<b>Porosity</b>	: <0.5%
	<b>Roots</b>	: Common, fine and very fine
<b>Calcium carbonate</b>	: Variably calcareous. Typically non-calcareous, range non-calcareous to very calcareous	

Subsoil has common, distinct, ochreous mottles.

Wetness Class: IV

Profiles are never calcareous throughout their full depth.