Agricultural Land Classification and Statement of Physical Characteristics Highfield Farm Whitley Bridge North Yorkshire October 1996

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AGRICULTURAL LAND CLASSIFICATION REPORT AND STATEMENT OF PHYSICAL CHARACTERISTICS HIGHFIELD FARM, WHITLEY BRIDGE, NORTH YORKSHIRE

Introduction

1. This report presents the findings of a detailed Statement of Physical Characteristics and Agricultural Land Classification (ALC) survey of 36.8ha of land at Highfield Farm, Whitley Bridge. The survey was carried out during October 1996.

2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Northallerton in connection with a proposal to extract clay from this land. This survey supersedes any previous ALC surveys on this land.

3. The work was conducted by members of the Resource Planning Team in the Leeds Statutory Group in ADAS. 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 land use on the site was a mixture of cereal stubble over the north west and south west of the site and silage grass over the remainder.

Summary

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:5000. 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)	% Total site area	% Surveyed Area
Grade 2	14.1	38.3	40.3
Subgrade 3a	14.7	40.0	42.0
Subgrade 3b	6.2	16.8	17.7
Other land	1.8	4.9	-
Total surveyed area	35.0	-	100
Total site area	36.8	100	-

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 38 borings and 3 soil pits were described.

8. Grade 2, very good quality agricultural land, covers 14.1 ha of the site to the east. The soils are well to moderately well drained, and consist of medium sandy loam, medium clay loam, and fine sandy silt loam topsoils, over gleyed medium clay loam and fine sandy silt loam upper subsoils in turn over occasional clay layers at depth. The ALC grade of this land is restricted by very slight soil wetness restrictions.

9. Subgrade 3a, good quality agricultural land, covers 14.7 ha of the site, located centrally and to the north west and west. The soils are imperfectly drained, and consist of stoneless medium clay loam and medium silty clay loam topsoils overlying gleyed slowly permeable medium clay loam upper subsoils, with occasional permeable medium sandy loams, in turn over stoneless gleyed permeable loamy medium sand and medium sand lower subsoils. Clay is occasionally encountered at around 115 cm depth. The ALC grade of this land is restricted by a slight soil wetness and workability limitation.

10. Subgrade 3b, moderate quality agricultural land, covers the remainder of the agricultural area. The soils are imperfectly drained, and consist of stoneless heavy clay loam topsoils over stoneless gleyed slowly permeable heavy silty clay loam upper subsoil, in turn over stoneless gleyed permeable loamy fine sand and fine sandy loam lower subsoils. Clay was occasionally encountered at around 105 cm - 110 cm depth.

11. In terms of soil resources, there are four main soil types on the site. The first (T1/U1/L1) consists of light to medium textured topsoils (median thickness 30 cm) overlying medium textured upper subsoils (mean thickness 59 cm) in turn over light textured lower subsoils (mean thickness 31 cm). The second soil type (T1/U2/L2) consists of light to medium textured topsoils (median thickness 30 cm) overlying light to medium textured upper subsoils (mean thickness 56 cm) in turn over heavy textured lower subsoils (mean thickness 34 cm). The third soil type T1/U3/L3 consists of light to medium textured topsoils (median thickness 30 cm) overlying heavy textured upper subsoils (mean thickness 41 cm) in turn over light to medium textured lower subsoils (mean thickness 49 cm). The fourth soil type (T2/U3/L3) consists of heavy textured topsoils (median thickness 30 cm) overlying heavy-textured upper subsoils (mean thickness 41 cm) in turn over light to medium textured lower subsoils (mean thickness 49 cm). The soils are typical of the Sessay association, showing localised variability in textures.

Factors Influencing ALC Grade

Climate

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

13. 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	SE 572183
Altitude	m, AOD	6
Accumulated Temperature	day°C (Jan-June)	1412
Average Annual Rainfall	mm	586
Field Capacity Days	days	120
Moisture Deficit, Wheat	mm	112
Moisture Deficit, Potatoes	mm	104

14. 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.

15. 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.

16. The combination of rainfall and temperature at this site means there is no climatic limitation on the ALC grade.

Site

17. The land on the site is level, and as such gradient does not limit ALC grade at any point, and neither flood risk nor micro-relief are of any significance on this site.

Geology and soils

18. This site is underlain by Bunter Sandstone overlain by silt and clay of the Vale of York drift (British Geological Survey, Sheet 79, Goole).

19. The soils correspond to the Sessay association as mapped by the Soil Survey of England and Wales (Sheet 1, Northern England).

Agricultural Land Classification

20. 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 2

21. Land in this grade covers the east of the site. The soils are well to moderately well drained, falling into Wetness Classes I and II (see Appendix II), and typically consist of stoneless medium sandy loam, fine sandy silt loam and medium clay loam topsoils which are underlain by stoneless gleyed medium clay loam and fine sandy silt loam, occasionally slowly permeable, upper subsoils in turn over stoneless medium sandy loam and loamy medium sand permeable lower subsoils. Occasional layers of slowly permeable clay are found at around 115 cm depth. The ALC grade of this land is limited by very slight soil wetness restrictions. Some borings show no physical limitations on grading and will fall into Grade 1. However, these soils are too dispersed for them to be mapped as a separate unit.

Subgrade 3a

22. Land in this subgrade covers the central and north-western parts of the site. The soils are imperfectly drained, falling into Wetness Class III (see Appendix II) and typically consist of stoneless medium clay loam and medium silty clay loam topsoils over similar stoneless gleyed slowly permeable upper subsoils in turn over stoneless gleyed permeable loamy medium sand and medium sand lower subsoils. Clay is occasionally encountered at around 115 cm depth. The ALC grade of this land is restricted by slight soil wetness restrictions.

Subgrade 3b

23 Land in this subgrade covers the remaining agricultural land. The soils are imperfectly drained, falling into Wetness Class III (see Appendix II), and typically consist of stoneless heavy clay loam topsoils over stoneless gleyed slowly permeable clay upper subsoils, in turn over stoneless gleyed permeable loamy fine sand lower subsoils. Slowly permeable clay is sometimes encountered below the third horizon between around 105 cm and 110 cm depth. The ALC grade of this land is restricted by slight soil wetness and moderate topsoil workability restrictions.

Other land

24. Other land consists of a pond and shelter belt in the centre of the site, farm buildings and an area of trees and scrub north-west of the farm.

Statement of Physical Characteristics

25. Four main soil types occur on this site, descriptions of which are given below. Topsoil and subsoil resources are also shown on the accompanying maps along with soil thickness and volume information.

(a) Soil Type 1:- Light to medium textured topsoils over medium-textured upper subsoils over light textured lower subsoils (T1/U1/L1). Full profile description, Appendix III).

(b) Soil Type 2:- Light to medium textured topsoils over light to medium-textured upper subsoils over heavy textured lower subsoils (T1/U2/L2).

(c) Soil Type 3:- Light to medium textured topsoils over heavy-textured upper subsoils over light to medium textured lower subsoils (T1/U3/L3). (Full profile description, Appendix III).

(d) Soil Type 4:- Heavy textured topsoils over heavy-textured upper subsoils over light to medium textured lower subsoils (T2/U3/L3). (Full profile description, Appendix III).

Soil Resources

26. (i) Topsoils

Unit T1 occurs over most of the site except around Highfield House and an area immediately east of Blowell drain (where topsoil T2 occurs). It is light to medium textured, generally consisting of medium clay loam, sandy silt loam and occasional medium sandy loam. The soils are stoneless with a moderately developed coarse subangular blocky to weakly developed medium subangular blocky structure and median thickness of 30 cm.

Unit T2 occurs over the remainder of the agricultural land. It is heavy textured, stoneless and has a moderately developed fine and medium subangular blocky structure. The median thickness of Unit T2 is 30 cm.

(ii) Upper Subsoils

Unit U1 underlies topsoil T1 to the east of the site. It is mainly medium textured consisting of medium clay loam, sandy clay loam and occasional medium sandy loam, and is stoneless. This upper subsoil has a weakly developed coarse angular blocky to medium prismatic structure and a mean unit thickness of 59 cm.

Unit U2 underlies topsoil T1 in the north of the site. It is light to medium textured consisting of medium silty clay loam and medium sandy silt loam, and is stoneless. This upper subsoil has a weakly developed coarse angular blocky to medium prismatic structure, and a mean unit thickness of 56 cm.

Unit U3 underlies both topsoil T1 and T2. It is heavy textured, consisting of clay, and is stoneless. This upper subsoil has weak to moderately developed medium prismatic and moderately developed coarse angular blocky structure. The mean unit thickness is 41 cm.

(iii) Lower Subsoils

Unit L1 underlies both T1 and U1. It is light textured, consisting of fine sandy silt loam, loamy medium sand with occasional medium sandy loams, and is stoneless. This lower subsoil generally has a weakly developed medium to coarse angular blocky structure and a mean thickness of 31 cm. Due to the variable nature of the Sessay association soils, clay is also encountered in the subsoil between 110 cm - 120 cm depth in some areas. However, it is too dispersed to be mappable.

Unit L2 underlies both T1 and U2. It is heavy textured, consisting of clay and silty clay, and is stoneless. This lower subsoil generally has a weakly developed medium prismatic structure and a mean unit thickness of 34 cm.

Unit L3 underlies either T1 or T2, and U3. It is light to medium textured but generally consists of stoneless loamy medium sand, medium sand and loamy fine sand. It generally has a weakly developed coarse angular blocky structure and a mean unit thickness of 49 cm. Again, due to the variable nature of the Sessay association soils, clay and silty clay subsoils are occasionally encountered between 105 cm and 120 cm depth over this area, but are too dispersed to be mappable.

27. The soils are typical of the Sessay association, meaning that localised variability may be encountered within the different mapping units if different auger sampling points are used. However, the above Statement of Physical Characteristics is a fair representation of the soil textures and soil volumes.

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SOURCES OF REFERENCE

British Geological Survey (1972) *Sheet No.* 79, Goole *(1:63,360 scale)* Solid and Sheet No. 79, Goole, (1:63360 scale), Drift (1971)
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 1, Soils of Northern England.*
SSEW: Harpenden.

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

SOIL WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Wetness Class	Duration of waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years.[2]
II	The soil profile is wet within 70 cm depth for 31-90 days in most years **or**, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but only wet within 40 cm depth for 30 days in most years.
III	The soil profile is wet within 70 cm depth for 91-180 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

[1] The number of days is not necessarily a continuous period.
[2] 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL PROFILE DESCRIPTIONS

1. Light to medium textured topsoils over medium to light textured subsoils (T1/U1/L1)

Location: Grid Reference SE57401840

Slope: 0°

Land Use: Silage Grass.

Weather: Bright, mild.

Depth (cm)	Horizon Description
0 - 26	Dark greyish brown (10YR4/2) fine sandy silt loam; no mottles; stoneless; dry; weakly developed medium subangular blocky structure; firm; many fine fibrous roots; slightly sticky; moderately plastic; non calcareous; clear wavy boundary.
26 - 115	Light grey (10YR7/1) fine sandy silt loam; common light yellowish brown (10YR6/4) and brownish yellow (10YR6/8) mottles; stoneless; dry; weakly developed coarse angular blocky and weakly developed medium prismatic structure; very hard; <0.5% pores >0.5 mm; common fine fibrous roots; slightly sticky; moderately plastic; non calcareous; clear wavy boundary.
115 +	Clay.

2. Light to medium textured topsoils over heavy-textured upper subsoils over light to meidum textured lower subsoils (T1/U3/L3)

Location: Grid Reference SE56701840

Slope: 0°

Land Use: Cereal stubble.

Weather: Bright, mild.

Depth (cm)	Horizon Description
0 - 28	Very dark greyish brown (10YR3/2) medium clay loam; no mottles; stoneless; slightly moist; moderately developed coarse subangular blocky structure; firm; >0.5% pores >0.5 mm; many fine fibrous roots; moderately sticky; moderately plastic; non calcareous; abrupt smooth boundary.
28 - 88	Grey (10YR6/1) medium sandy loam; many yellowish brown (10YR5/8) mottles; stoneless; dry; moderately developed coarse angular blocky structure; firm; <0.5% pores >0.5 mm; few fine fibrous roots; slightly sticky; slightly plastic; non calcareous; abrupt smooth boundary.
88 - 120	Light brownish grey (10YR6/2) loamy medium sand; many dark yellowish brown (10YR4/6) mottles; stoneless; slightly moist; moderately developed medium subangular blocky structure; friable; > 0.5% pores > 0.5 mm; slightly sticky; non plastic; non calcareous.

3. Heavy textured topsoil over heavy-textured upper subsoil over light to medium textured lower subsoil (T2/U3/L3).

Location: Grid Reference SE 566551815

Slope: 0°

Land Use: Cereal Stubble.

Weather: Bright, mild.

Depth (cm)	Horizon Description
0 - 20	Dark brown (10YR3/3) heavy clay loam; no mottle; stoneless; moist; moderately developed fine and medium subangular blocky structure; firm; > 0.5% pores > 0.5 mm; common fine and very fine fibrous roots; moderately sticky; moderately plastic; non calcareous; clear smooth boundary.
20 - 54	Grey (10YR6/1) clay; common strong brown (75YR5/8) and many reddish yellow (10YR6/8) mottles; stoneless; moist; weakly developed medium prismatic structure; extremely firm; <0.5% pores > 0.5 mm; common very fine fibrous roots; very sticky; very plastic; non calcareous; clear smooth boundary.
54 - 104	Very pale brown (10YR7/3) loamy fine sand; many brownish yellow (10YR6/6) and common very pale brown (10YR8/3) mottles; stoneless; slightly moist; weakly developed coarse angular blocky structure; firm; > 0.5% pores > 0.5 mm; common very fine fibrous roots; slightly sticky; non plastic; non calcareous; abrupt smooth boundary.
104 - 120	Grey (75YR5/0) heavy silty clay loam; common reddish yellow (75YR6/8) mottles; stoneless; moist; weakly developed medium prismatic and coarse angular blocky structure; extremely firm; < 0.5% pores > 0.5 mm; few very fine fibrous roots; moderately sticky; very plastic; non calcareous.