SFCS 81 88A

Land at West Hagley, South

Agricultural Land Classification

December 1997

Resource Planning Team
Bristol
FRCA Western Region

Job Number 45/97

MAFF Ref: 17/089

LAND AT WEST HAGLEY, SOUTH

AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 68.7 ha of land on the southern edge of West Hagley, next to the A491. Field survey was based on 69 auger borings and eight soil profile pits, and was carried out in April and August 1997. During the survey one sample was analysed for particle size distribution (PSD).

2. The survey was conducted by the Resource Planning Teams of FRCA Northern Region and FRCA Western Region on behalf of MAFF in its statutory role in the preparation of the Bromsgrove District Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. Apart from the published regional ALC map (MAFF 1977), which shows the site at a reconnaissance scale as being mostly Grade 2 with some Grade 3 land next to Gallows Brook, the site was previously surveyed in 1987 at a scale of 1:25 000 (ADAS 1987). Land to the north of Western Road and to the East of Strathearn was also surveyed in 1994 at a scale of 1:10 000 (ADAS 1994). However, the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF 1988) and supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.

4. The land to the north of Western Road and to the East of Strathearn was surveyed in 1994 (ADAS 1994) and was mapped as mostly Grade 2, with areas of Grade 1 land and smaller areas of Grades 3a, 3b and 5 next to Gallows Brook. When the adjacent land was being surveyed it was decided to survey part of the previously surveyed land again because of grading difficulties encountered in 1994. The land to the north of Gallows Brook consists of a variable area of shallow sandstone, mapped as Subgrade 3a surrounded by deeper profiles that are Grades 1 and 2. In 1994 some Subgrade 3a profiles were included in the Grade 2 mapping unit but the shallow profiles are now known to be more extensive than previously thought.

5. The land between Gallows Brook and Western Road was mainly mapped in 1994 as Grade 2 with a small area of Grade 1 land. This was because of a minor drought limitation due to the sandy textured horizons. The Grade 2 land corresponds to a few impenetrable borings and profiles with textures containing medium sand, while the Grade 1 textures contain fine sand which can hold more water. The 1997 map shows the two fields to have a larger area of Grade 1 land in them. Hand texturing fine and medium sand is unreliable, and this together with the problems associated with impenetrable borings can explain the conflicting mapping units. The extra borings show that the area is variable and that the 1997 map is a more appropriate grading.

6. At the time of survey land cover was under cereals and grassland. Other land that was not surveyed included residential areas and woodland.

SUMMARY

7. The distribution of ALC grades is shown on the accompanying 1:10 000 scale ALC map. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas. Areas are summarised in the Table 1.

Table 1: Distribution of ALC grades: Land at West Hagley, South

Grade	Area (ha)	% Surveyed Area (60.0 ha)
1	28.9	48
2	19.4	32
3a	9.4	16
3b	0.6	1
5	1.7	3
Other land	8.7	-
Total site area	68.7	100

8. The agricultural land on this site has been mapped as Grade 1 (excellent quality), Grade 2 (very good quality), Subgrade 3a (good quality) and Grades 3b and 5. The key limitations to the agricultural use of the land are soil droughtiness, soil wetness and gradient. An area of 57.7 ha of land was graded as best and most versatile, this being 96 % of the agricultural land surveyed.

9. The Grade 1 land is located mainly in the east of the site and has no or only very minor limitations to its agricultural use. These profiles are deep, fine sandy and well drained with no drought limitation. They are developed over the Bromsgrove sandstone.

10. The Grade 2 land is mapped throughout the site. The soils in these areas commonly comprise either a medium sandy loam or sandy clay loam overlying medium loamy sand and medium sand to depth. They mainly have a minor droughtiness limitation but in places there may also be a minor wetness limitation.

11. The Subgrade 3a land is located in the south west and north east of the site. These soils commonly comprise a sandy loam topsoil overlying sandy loam, loamy sand and sand to depth. They have higher stone contents than elsewhere in the site and the sandstone bedrock may be found within the top 120 cm of the profile. This leads to a moderate droughtiness limitation.

12. The small areas of Subgrade 3b and Grade 5 have moderate and severe limitations respectively due to their steep gradients.

CLIMATE

13. Estimates of climatic variables for this site were derived from the published agricultural climate dataset "Climatological Data for Agricultural Land Classification" (Meteorological

Office 1989) using standard interpolation procedures. Data for key points around the site are given in Table 2 below.

14. Since the ALC grade of land is determined by the most limiting factor present, overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions. Parameters used for assessing overall climate are accumulated temperature, a measure of relative warmth and average annual rainfall, a measure of overall wetness. The results shown in Table 2 indicate that there is no overall climatic limitation.

15. Climatic variables also affect ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes, which are compared with the moisture available in each profile in assessing soil droughtiness limitations. These are described in later sections.

Table 2: Climatic Interpolations: Land at West Hagley, South

Grid Reference		SO 901 795	SO 908 797	SO 910 804
Altitude (m)		90	110	125
Accumulated Temperature (day °C)		1392	1369	1352
Average Annual Rainfall (mm)		728	741	751
Overall Climatic Grade		1	1	1
Field Capacity Days		169	171	173
Moisture deficit (mm):	Wheat	95	92	90
	Potatoes	83	80	76

RELIEF

16. Altitude ranges from 90 m at Worcester Road to 125 m on the A491, and 128 m at the War Memorial on Kidderminster Road. Gradients within the site area are mainly level (0-1°), gently (2-3°) and moderately (4-7°) sloping with no limitation to the agricultural use of the land. There is some strongly (8-11°) and steeply (18-25°) sloping land in the valley of Gallows Brook, to the north of Strathearn. These gradients will limit the ALC grades to Subgrade 3b and Grade 5.

GEOLOGY AND SOILS

17. The underlying geology of the site is shown on the published geology map (BGS 1975) as Lower Keuper Sandstone (red brown sandstone with pebble beds) which, in the west of the site is overlain with deposits of Breccia Gravels. Evidence of soil types that develop over sandstone was found over most of the site and in some places weathered sandstone was found within the top 120 cm of the profiles. To the west of Thicknall Farm the profiles were stony but the area of these soils is not as large as expected from the geology map.

18. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW 1983) as being from the Bromsgrove Association. These are described

as being well-drained reddish coarse loamy soils mainly over soft sandstone, but deep in places. They are associated with fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

19. The soils found during the current survey were similar to those described by the Soil Survey. They are generally of either a sandy loam or sandy clay loam texture over sandy loam, loamy sand and sand at depth, with occasional heavier profiles of heavy clay loam and clay. Some profiles were also shallow over weathered sandstone. The stony profiles near Thicknall Farm had increased stone contents but still have sandy textures and are derived from sandstone.

AGRICULTURAL LAND CLASSIFICATION

20. The distribution of ALC grades found by the current survey is shown on the accompanying 1:10 000 scale map and areas are summarised in Table 1. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas.

Grade 1

21. Land mapped as Grade 1 occurs mainly over the sandstone to the north east of Thicknall Farm. These soils have either a sandy clay loam or medium and fine sandy loam topsoils over either sandy clay loam or medium and fine sandy loam subsoils to depth. The profiles were well drained and were assessed as Wetness Class I (see Appendix 2) as shown by pits 3P, 4P and 8P. Bands of heavy clay loam and clay occasionally occur towards the bottom of these profiles and some of these are slowly permeable layers. It was not possible to map out these small variations in soil type at this level of detail.

Grade 2

22. Grade 2 land occurs throughout the site. The soils generally have either a medium sandy loam or sandy clay loam topsoils over medium loamy sand and medium sand to depth with few or no stones within the profile. Pits 6P and 5P are typical of these mapping units. Some overlie impenetrable sandstone at varying depths. The moisture balance places these soils in Grade 2 with the main limitation to the agricultural use of this land being soil droughtiness.

23. Occasional bands of clay that were assessed as slowly permeable layers are found within some profiles. There are no gleyed horizons associated with these so the profiles were assessed as Wetness Class II. These are found near Lower Clent and the ponds and woodland to the north east of Thicknall Farm.

Subgrade 3a

24. Land graded as Subgrade 3a is found in the south west and north east corners of the site. In the south west the soils have either a medium sandy loam or sandy clay loam topsoil, slightly to moderately stony, overlying medium sandy loam, medium loamy sand and medium sand to depth. The profiles were assessed as Wetness Class I. The moisture balances place

these soils in Subgrade 3a on droughtiness. There are also individual profiles which have a moderate topsoil stone content limitation.

25. The Subgrade 3a map unit to the north of Strathearn shows an area where the weathered sandstone is found closer to the surface. This increases the droughtiness of the profiles and may cause a depth limitation in places. Although this field also has a Grade 1 mapping unit in it, it was considered that the this shallow area would affect the management of the land.

Subgrade 3b and Grade 5

26. The small areas of land mapped as Subgrade 3b and Grade 5 are limited by their gradients. The Subgrade 3b land having gradients of 8-11° and the Grade 5 land over 18°.

Other Land

27. Other land includes residential areas (houses and gardens) and agricultural buildings, roads, ponds and woodland.

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APPENDIX I

DESCRIPTION OF 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 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 root crops. The level of yield 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 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 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 most 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.

Source: MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land, MAFF Publications, Alnwick.

APPENDIX II

DEFINITION OF SOIL WETNESS CLASSES

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile.

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

Wetness Class 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 not wet within 40 cm depth for more than 30 days in most years.

Wetness Class 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 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 and 90 days in most years.

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

Notes: The number of days specified is not necessarily a continuous period.

'In most years' is defined as more than 10 out of 20 years.

Source: Hodgson, J M (In preparation) Soil Survey Field Handbook, Revised Edition.

APPENDIX III

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1974).

1. Terms used on computer database, in order of occurrence.

GRID REF: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

WHT:	Wheat	**SBT:**	Sugar Beet	**HTH:**	Heathland
BAR:	Barley	**BRA:**	Brassicas	**BOG:**	Bog or Marsh
OAT:	Oats	**FCD:**	Fodder Crops	**DCW:**	Deciduous Wood
CER:	Cereals	**FRT:**	Soft and Top Fruit	**CFW:**	Coniferous Woodland
MZE:	Maize	**HRT:**	Horticultural Crops	**PLO:**	Ploughed
OSR:	Oilseed Rape	**LEY:**	Ley Grass	**FLW:**	Fallow (inc. Set aside)
POT:	Potatoes	**PGR:**	Permanent Pasture	**SAS:**	Set Aside (where known)
LIN:	Linseed	**RGR:**	Rough Grazing	**OTH:**	Other
BEN:	Field Beans	**SCR:**	Scrub		

GRDNT: Gradient as estimated or measured by hand-held optical clinometer.

GLEY, SPL: Depth in centimetres to gleying or slowly permeable layer.

AP (WHEAT/POTS): Crop-adjusted available water capacity.

MB (WHEAT/POTS): Moisture Balance. (Crop adjusted AP - crop potential MD)

DRT: Best grade according to soil droughtiness.

If any of the following factors are considered significant, 'Y' will be entered in the relevant column.

MREL:	Microrelief limitation	**FLOOD:**	Flood risk	**EROSN:**	Soil erosion risk
EXP:	Exposure limitation	**FROST:**	Frost prone	**DIST:**	Disturbed land
CHEM:	Chemical limitation				

LIMIT: The main limitation to land quality: The following abbreviations are used.

OC:	Overall Climate	**AE:**	Aspect	**EX:**	Exposure
FR:	Frost Risk	**GR:**	Gradient	**MR:**	Microrelief
FL:	Flood Risk	**TX:**	Topsoil Texture	**DP:**	Soil Depth

CH:	Chemical	**WE:**	Wetness	**WK:**	Workability
DR:	Drought	**ER:**	Erosion Risk	**WD:**	Soil Wetness/Droughtiness
ST:	Topsoil Stoniness				

TEXTURE: Soil texture classes are denoted by the following abbreviations:-

S:	Sand	**LS:**	Loamy Sand	**SL:**	Sandy Loam
SZL:	Sandy Silt Loam	**CL:**	Clay Loam	**ZCL**	Silty Clay Loam
ZL:	Silt Loam	**SCL:**	Sandy Clay Loam	**C:**	Clay
SC:	Sandy clay	**ZC:**	Silty clay	**OL:**	Organic Loam
P:	Peat	**SP:**	Sandy Peat	**LP:**	Loamy Peat
PL:	Peaty Loam	**PS:**	Peaty Sand	**MZ:**	Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:-

F: Fine (more than 66% of the sand less than 0.2mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content: **M:** Medium (< 27% clay) **H:** heavy (27 - 35% clay)

MOTTLE COL: Mottle colour using Munsell notation.

MOTTLE ABUN: Mottle abundance, expressed as a percentage of the matrix or surface described.

F: few <2% **C:** common 2 - 20% **M:** many 20 - 40% **VM:** very many 40%+

MOTTLE CONT: Mottle contrast

F: faint - indistinct mottles, evident only on close inspection
D: distinct - mottles are readily seen
P: Prominent - mottling is conspicuous and one of the outstanding features of the horizon.

PED. COL: Ped face colour using Munsell notation.

GLEY: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

STONE LITH: Stone Lithology - One of the following is used.

HR:	All hard rocks and stones	**SLST:**	Soft oolitic or dolimitic limestone
CH:	Chalk	**FSST:**	Soft, fine grained sandstone
ZR:	Soft, argillaceous, or silty rocks	**GH:**	Gravel with non-porous (hard) stones
MSST:	Soft, medium grained sandstone	**GS:**	Gravel with porous (soft) stones

SI: Soft weathered igneous or metamorphic rock

Stone contents are given in % by volume for sizes >2cm, >6cm and total stone >2mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

Degree of development	**WK:**	Weakly developed	**MD:**	Moderately developed
	ST:	Strongly developed		
Ped size	**F:**	Fine	**M:**	Medium
	C:	Coarse	**VC:**	Very coarse
Ped Shape	**S:**	Single grain	**M:**	Massive
	GR:	Granular	**AB:**	Angular blocky
	SAB:	Sub-angular blocky	**PR:**	Prismatic
	PL:	Platy		

CONSIST: Soil consistence is described using the following notation:

L:	Loose	**VF:**	Very Friable	**FR:**	Friable	**FM:**	Firm
VM:	Very firm	**EM:**	Extremely firm	**EH:**	Extremely Hard		

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

VIS:	Visual	**S:**	Sieve	**D:**	Displacement

MOTTLE SIZE:

EF:	Extremely fine <1mm	**M:**	Medium 5-15mm
VF:	Very fine 1-2mm>	**C:**	Coarse >15mm

F: Fine 2-5mm

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (*OM*) or grey (*GM*).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' should also be noted.

MANGANESE CONCRETIONS: Assessed by volume

N:	None		**M:**	Many	20-40%
F:	Few	<2%	**VM:**	Very Many	>40%
C:	Common	2-20%			

STRUCTURE: Ped Development *

WA:	Weakly adherent	**M:**	Moderately developed
W:	Weakly developed	**S:**	Strongly developed

POROSITY:

P: Poor - less than 0.5% biopores at least 0.5mm in diameter
G: Good - more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per $100cm^2$:		Very Fine and Fine	Medium and Coarse
F:	Few	1-10	1 or 2
C:	Common	10.25	2 - 5
M:	Many	25-200	>5
A:	Abundant	>200	

ROOT SIZE

VF:	Very fine	<1mm	**M:**	Medium	2 - 5mm
F:	Fine	1-2mm	**C:**	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp:	<0.5cm	**Gradual:**	6 - 13cm
Abrupt:	0.5 - 2.5cm	**Diffuse:**	>13cm
Clear:	2.5 - 6cm		

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*
* See Soil Survey Field Handbook (Hodgson, 1974) for details.