West Wiltshire Local Plan

Bradford-on-Avon

Agricultural Land Classification
October 1996

Resource Planning Team
Taunton Statutory Group
ADAS Bristol

Job Number 17/96
Commission 1114
MAFF Reference EL 45/1201

Ministry of Agriculture, Fisheries and Food
Land Use Planning Unit

WEST WILTSHIRE LOCAL PLAN
BRADFORD-ON-AVON

AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

8FC4230B

17/96

WEST WILTSHIRE LOCAL PLAN
BRADFORD-ON-AVON

AGRICULTURAL LAND CLASSIFICATION SURVEY

SUMMARY

1. This report presents the findings of a reconnaissance scale Agricultural Land Classification (ALC) survey of 615.1 ha of land on the northern and eastern edges of Bradford-on-Avon, Wiltshire. Field survey was based on 110 auger borings and six soil profile pits, and was completed in July and August 1996.

2. The survey was conducted by the Resource Planning Team of the ADAS Taunton Statutory Group on behalf of MAFF Land Use Planning Unit in its statutory role in the preparation of the West Wiltshire Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant sections. The published regional ALC map (MAFF, 1977) shows the site at a reconnaissance scale to be mainly Grade 3, with small areas of Grade 2 on the higher ground to the north of the town and Grade 4 along the River Avon. Part of the current survey area, around Woolley, had been previously surveyed (ADAS, 1981). However, the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and supersedes these previous ALC surveys. Grade descriptions are summarised in Appendix I.

4. Two small areas of land between the current survey area and the town, at Woolley and the golf course, had previously been surveyed by the Resource Planning Team under the Revised Guidelines (ADAS: 1993a and 1993b). The findings of these surveys were taken into account during the current survey.

5. At the time of survey the land cover was mainly winter cereals and permanent pasture. Small areas of forage maize, combinable beans, carrots and rape were also surveyed. Other land which was not surveyed included woodland, agricultural buildings, sewage works and residential areas.

6. The distribution of ALC grades is shown on the accompanying 1: 25 000 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 smaller sites. Areas are summarised in the Table 1.

7. Almost half of the agricultural land surveyed (41%) was found to be 'best and most versatile'. The majority of which has been classified as Subgrade 3a (good quality land) with some small areas of Grade 1 (excellent quality) and Grade 2 land (very good quality). The remainder of the site was mapped as Subgrade 3b land (moderate quality).

8. A small area of Grade 1 land, which has no limitation, is mapped on the eastern side of the town, near Great Bradford Wood. This unit occupies a terrace above the River Avon where the profiles are deep and well drained with no drought limitation.

Table 1: Distribution of ALC grades: Bradford-on-Avon

Grade	Area (ha)	% Surveyed Area (479.4 ha)
1	18.8	3.9
2	9.9	2.1
3a	169.8	35.4
3b	280.9	58.6
Other land	135.7	-
Total site area	615.1	-

9. The area of Grade 2 land at Widbrook is mainly limited by minor workability and drought limitations. The profiles typically consist of heavy clay loam topsoils overlying permeable medium sandy loam and sandy clay loam subsoils. The relatively high stone contents of the lower horizons, together with the coarse textured lower subsoils and the relatively dry climatic conditions means that the amount of available moisture in the profile is reduced such that the soils will not be able to meet the potential crop moisture requirements throughout the year. This is likely to have the effect of restricting the level of consistency of crop yields in most years. The heavy topsoil textures in combination with the local climate will also cause a limitation by reducing the amount of time that the land is in a workable condition as well as affecting crop choice.

10. The areas of Subgrade 3a land mainly have heavy clay loam topsoils over slightly stony, permeable clay subsoils and are well drained. The heavy topsoil textures cause a workability limitation effective for longer than that affecting the Grade 2 land mentioned in Paragraph 9. There are also some areas, around Maplecroft and near Staverton, where the topsoil textures are more variable and small areas of Grade 2 land exist. It was not appropriate to map these areas at this scale of survey.

11. Most of the land mapped in the survey is Subgrade 3b having a moderate wetness limitation. These profiles typically have heavy clay loam and clay topsoils over clay subsoils with severely restricted drainage. These areas have similar limitations to those of the Subgrade 3a land but to a greater degree.

WEST WILTSHIRE LOCAL PLAN
BRADFORD-ON-AVON

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a reconnaissance scale Agricultural Land Classification (ALC) survey of 615.1 ha of land on the northern and eastern edges of Bradford-on-Avon, Wiltshire. Field survey was based on 110 auger borings and six soil profile pits, and was completed in July and August 1996.

2. The survey was conducted by the Resource Planning Team of the ADAS Taunton Statutory Group on behalf of MAFF Land Use Planning Unit in its statutory role in the preparation of the West Wiltshire Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant sections. The published regional ALC map (MAFF, 1977) shows the site at a reconnaissance scale to be mainly Grade 3, with small areas of Grade 2 on the higher ground to the north of the town and Grade 4 along the River Avon. Part of the current survey area, around Woolley, had been previously surveyed (ADAS, 1981). However, the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and supersedes these previous ALC surveys. Grade descriptions are summarised in Appendix I.

4. Two small areas of land between the current survey area and the town, at Woolley and the golf course, had previously been surveyed by the Resource Planning Team under the Revised Guidelines (ADAS: 1993a and 1993b). The findings of these surveys were taken into account during the current survey.

5. At the time of survey the land cover was mainly winter cereals and permanent pasture. Small areas of forage maize, combinable beans, carrots and rape were also surveyed. Other land which was not surveyed included woodland, agricultural buildings, sewage works and residential areas.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1: 25 000 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 smaller sites. Areas are summarised in the Table 1.

7. Almost half of the agricultural land surveyed (41%) was found to be 'best and most versatile'. The majority of which has been classified as Subgrade 3a (good quality land) with some small areas of Grade 1 (excellent quality) and Grade 2 land (very good quality). The remainder of the site was mapped as Subgrade 3b land (moderate quality).

8. A small area of Grade 1 land, which has no limitation, is mapped on the eastern side of the town, near Great Bradford Wood. This unit occupies a terrace above the River Avon where the profiles are deep and well drained with no drought limitation.

Table 1: Distribution of ALC grades: Bradford-on-Avon

Grade	Area (ha)	% Surveyed Area (479.4 ha)
1	18.8	3.9
2	9.9	2.1
3a	169.8	35.4
3b	280.9	58.6
Other land	135.7	-
Total site area	615.1	-

9. The area of Grade 2 land at Widbrook is mainly limited by minor workability and drought limitations. The profiles typically consist of heavy clay loam topsoils overlying permeable medium sandy loam and sandy clay loam subsoils. The relatively high stone contents of the lower horizons, together with the coarse textured lower subsoils and the relatively dry climatic conditions means that the amount of available moisture in the profile is reduced such that the soils will not be able to meet the potential crop moisture requirements throughout the year. This is likely to have the effect of restricting the level of consistency of crop yields in most years. The heavy topsoil textures in combination with the local climate will also cause a limitation by reducing the amount of time that the land is in a workable condition as well as affecting crop choice.

10. The areas of Subgrade 3a land mainly have heavy clay loam topsoils over slightly stony, permeable clay subsoils and are well drained. The heavy topsoil textures cause a workability limitation effective for longer than that affecting the Grade 2 land mentioned in Paragraph 9. There are also some areas, around Maplecroft and near Staverton, where the topsoil textures are more variable and small areas of Grade 2 land exist. It was not appropriate to map these areas at this scale of survey.

11. Most of the land mapped in the survey as Subgrade 3b having a moderate wetness limitation. These profiles typically have heavy clay loam and clay topsoils over clay subsoils with severely restricted drainage. These areas have similar limitations to those of the Subgrade 3a land but to a greater degree.

CLIMATE

12. 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.

13. 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.

14. Climatic variables also affect ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity (FC) days 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. The crop-adjusted soil moisture deficits at the site are above the average for the region which will increases the likelihood of soil droughtiness limitations. These are described in later sections. A critical boundary of 175-176 FC days was found running along the 65 m contour near Woolley Green.

Table 2: Climatic Interpolations: Bradford-on-Avon

Grid Reference		ST 851 606	ST 822 625
Altitude (m)		30	110
Accumulated Temperature (day °C)		1515	1423
Average Annual Rainfall (mm)		759	836
Overall Climatic Grade		1	1
Field Capacity Days		170	183
Moisture deficit (mm):	Wheat	104	91
	Potatoes	97	80

Grid Reference		ST 835 618	ST 838 616
Altitude (m)		75	65
Accumulated Temperature (day °C)		1463	1475
Average Annual Rainfall (mm)		805	795
Overall Climatic Grade		1	1
Field Capacity Days		178	176
Moisture deficit (mm):	Wheat	97	98
	Potatoes	87	90

RELIEF

15. Altitude ranges from 30 m along the River Avon to 110 m near Frankleigh House on the Bath Road. The site drops down from this high point to the River Avon with gentle and moderate gradients (0-7°) which are not limiting. There is an area of strongly sloping land (8-11°) rising up from the Kennet and Avon Canal at Widbrook to the level land near Trowbridge which does limit the lands usage.

GEOLOGY AND SOILS

16. The underlying geology of the site is shown on the published geology maps (IGS: 1965 and 1990). Much of the Eastern part of the site is underlain by Kellaways Clays with recent deposits of river alluvium and terrace gravels along the River Avon. Towards the west there is a sequence of bands of Cornbrash Limestone, Forest Marble Clay and Shelly limestone which are all from the Jurassic Era. The Shelly Limestone is found at Woolley Green and Leigh Grove.

17. Evidence from the soil types found during the survey suggests that the Forest Marble Clay and Shelly Limestone areas are variable in their location. Soils developed over the Kellaways Clays, river alluvium and terrace gravels, and the Cornbrash Limestone were found to match the geology.

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 several soil associations. Their mapping closely follows the geology with poorly drained clayey soils from the Wickham 2 and 3, and the Evesham 1 Associations having formed over the Kellaways and Forest Marble Clays. Over the Jurassic limestone shallow, well drained and in places poorly drained soils from the Sherborne and Bursledon Associations are mapped. While the alluvium and terrace gravels have developed soils from the Fladbury 1 Association which can be affected by groundwater.

19. The soils found during the current survey closely match those identified by the Soil Survey and on the whole follow the geology of the site. The majority of the site consists of poorly drained clayey soils similar to those of the Wickham 2 and 3, Evesham 1 and Fladbury 1 Associations. There are smaller areas of more permeable, stony soils over the limestone, especially between Woolley Green and Great Bradford Wood.

AGRICULTURAL LAND CLASSIFICATION

20. The distribution of ALC grades found by the current survey is shown on the accompanying 1: 25 000 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. The small area of Grade 1 land lies on a terrace adjacent to Great Bradford Wood, overlooking the River Avon. These profiles have sandy clay loam and medium clay loam topsoils over stoneless, permeable heavy clay loam and clay subsoils. In a couple of borings the gravel deposits and gleying were seen at depth. They were assessed as Wetness Class I (see Appendix II) and have no drought limitation. This area is represented by Pit 4.

Grade 2

22. The small area of Grade 2 land has a minor drought and workability limitations. The profiles are well drained and were assessed as Wetness Class I. The medium clay loam topsoil textures in combination with the local climate will also cause a limitation by reducing the amount of time that the land is in a workable condition. There are also relatively high stone contents in the lower subsoils. This will restrict the amount of available moisture in the profile and the soils will not be able to meet the potential crop moisture requirements throughout the year. This is likely to have the effect of slightly restricting the level of consistency of crop yields in most years. This area links with a larger mapping unit from a previous survey to the north of this unit, where a soil pit showing a similar profile was examined (ADAS, 1993a).

Subgrade 3a

23. The majority of the Subgrade 3a mapping units have moderate workability limitations, although there are also some small areas which are droughty and wet. The profiles on the northern edge of the town, around Woolley Green, generally have heavy clay loam topsoils over permeable clay subsoils. They were assessed as Wetness Class I. The heavy topsoil textures, combined with the local climate will reduce the amount of time that the land is in a workable condition as well as affecting crop choice. Pit 1 is an example of these profiles. This pit also shows the presence of limestone rubble, 34% by volume, in the subsoils developed from the Cornbrash limestone.

24. The mapping unit around Maplecroft, on the Bath Road, is similar but there is a greater degree of variability in the topsoil texture with some profiles having sandy clay loam topsoils. Pit 2 is an example of these borings which were are Grade 2 profiles in a Subgrade 3a mapping unit.

25. The area of the Subgrade 3a land near Staverton has a moderate wetness limitation with similar problems to those mentioned in Paragraph 23. A typical profile has medium clay loam topsoils over heavy clay loam and clay subsoils. The permeability of the lower subsoils is variable but in places slowly permeable layers are present below 55 cm. These were assessed as Wetness Class III, but there are some small areas of better quality land within this mapping unit.

26. An area of droughty Subgrade 3a land is mapped to the north of Widbrook. This matches an area described in the 1993 survey (ADAS, 1993a). The profiles have medium clay loam topsoils and the borings were impenetrable at 25-30 cm. A pit was examined during the previous survey to confirm the grade.

Subgrade 3b

27. Within these mapping units, which have moderate limitations to their agricultural use, there are two main types of profile both of which have moderate wetness limitations. The land use is restricted to a narrow range of crops with moderate yields, or a wider range of crops with lower yields. The profiles around Maplecroft and to the East of Great Bradford Wood have heavy clay loam topsoils over clay subsoils. Unlike the Subgrade 3b profiles in the eastern part of the site the impeded drainage does not start until the lower subsoils. Gleying is

not always present in the upper subsoils and slowly permeable layers start at around 45-50 cm so the profiles were assessed as Wetness Class III. These soils are developed over the Jurassic Era lithology which has variable drainage characteristics.

28. The large blocks of Subgrade 3b in the eastern part of the site, developed over the Kellaways Clay, also have a moderate wetness limitation. The profiles typically have sandy clay loam and heavy clay loam topsoils over clay subsoils. Here the slowly permeable layers are found higher up in these profiles, starting at around 25-30 cm, immediately below the topsoil in most cases. The profiles were therefore assessed as Wetness Class IV. The limitations to their agricultural use are similar to those mentioned in Paragraphs 23 and 27.

29. There is a small area of land at Widbrook which is strongly sloping and has a moderate gradient limitation. Here the gradients of up to 10° will restrict the safe and accurate use of some agricultural machinery.

H Lloyd Jones
Resource Planning Team
Taunton Statutory Group
ADAS Bristol
October 1996

REFERENCES

ADAS RESOURCE PLANNING TEAM, (1981) *Agricultural Land Classification Survey of Bradford-on-Avon*. Reference 4, ADAS Bristol.

ADAS RESOURCE PLANNING TEAM, (1993a) *Agricultural Land Classification Survey of Bradford-on-Avon Golf Course*. Reference 17/93, ADAS Bristol.

ADAS RESOURCE PLANNING TEAM, (1993b) *Agricultural Land Classification Survey of Bradford-on-Avon*. Reference 67/93, ADAS Bristol.

INSTITUTE OF GEOLOGICAL SCIENCES (1965) *Sheet 281, Frome*. 1:63 360 series Solid and Drift edition. IGS, London.

INSTITUTE OF GEOLOGICAL SCIENCES (1990) *Sheet 265, Bath*. 1:50 000 series Solid and Drift edition. IGS, London.

HODGSON, J M (Ed) (1974) *Soil Survey Field Handbook, Technical Monograph No 5*. Soil Survey of England and Wales, Harpenden.

HODGSON, J M (In preparation) *Soil Survey Field Handbook*. Revised edition.

MAFF (1977) 1:250 000 series *Agricultural Land Classification, South West Region*. MAFF Publications, Alnwick.

MAFF (1988) *Agricultural Land Classification of England and Wales. Revised Guidelines and Criteria for grading the quality of agricultural land*. MAFF Publications, Alnwick.

METEOROLOGICAL OFFICE (1989) *Climatological Data for Agricultural Land Classification*. Meteorological Office, Bracknell.

SOIL SURVEY OF ENGLAND AND WALES (1983) *Sheet 5, Soils of South West England*. SSEW, Harpenden.

SOIL SURVEY OF ENGLAND AND WALES (1984) *Soils and Their Use in South West England, Bulletin No 14*. SSEW, Harpenden.

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.

AB (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
MISST:	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.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 1 (ASP34)	2° South	Permanent Grass	Av Rainfall: 785 mm ATO: 1486 day °C	Cornbrash Limestone
JOB NO.	DATE	grid reference	DESCRIBED BY	FC Days: 174 Climatic Grade: 1	SOIL SAMPLE REFERENCES
17/96	31/7/96	ST 841 611	PB/HLJ	Exposure Grade: -	None

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	14	C	10YR43	10%>2cm(S) 9%<2cm (S&D) 19% HR TOTAL	NONE	NONE	-	-	-	-	MF & VF	-	Gradual Smooth
2	48	C	10YR44	15%>2cm(S) 19%<2cm(S&D) 34% HR TOTAL	NONE	NONE	MMSAB	FIRM	GOOD	GOOD	CF & VF	-	Gradual Smooth
3	75	C	7.5YR46	2%>2cm(S) 30%<2cm(S&D) 32% HR TOTAL	NONE	NONE	MMSAB	FIRM	GOOD	GOOD	FF & VF	-	Gradual Smooth
4	87+	C	7.5YR54	10% HR TOTAL (VIS)	NONE	FEW	-	-	-	-	-	-	-

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No spl

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 129 mm

Potatoes: 100 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90 mm

Moisture Balance Wheat: +31 mm

Potatoes: +10 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks: Augered to 120cm
H4 is not an spl. Better drainage than the paler subsoils

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 2 (Asp 5)	1° North	Ley Grass	Av Rainfall: 795 mm ATO: 1475 day °C	Shelly (Forest Marble) Limestone
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 176 Climatic Grade: 1	SOIL SAMPLE REFERENCES
17/96	31/7/96	ST 822 624	HLJ/PB	Exposure Grade: -	RPT/PB/384

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	23	SCL	10YR44	2%HR(VIS)	NONE	NONE	-	-	-	-	MF+VF	-	Abrupt Smooth
2	46	C	10YR54	<1% HR	NONE	NONE	WCAB (with platy tendencies)	Friable	Moderate	Good	CF+VF	-	Gradual Smooth
3	72	C	10YR66	<1% HR	NONE	NONE	WCSAB	Friable	Moderate	Good	FF+VF	-	Abrupt Irregular
	(62)	C	10YR63		CDFO (10YR58)	NONE					FVF	-	Abrupt Irregular
4	95+	C	10YR64	60%HR (VIS)	NONE	NONE	-	-	-	-	FVF	-	-

Profile Gleyed From: Intermittent above H4

Depth to Slowly Permeable Horizon: No spl

Wetness Class: I

Wetness Grade: 2

Available Water Wheat: 118 mm

Potatoes: 116 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90 mm

Moisture Balance Wheat: 20 mm

Potatoes: 26 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 2

Main Limiting Factor(s): Workability

Remarks: Gleying at bottom of H3 is intermittent which shows reduced porosity in H4. Mapped in a Subgrade 3a unit.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 3 (ASP50)	2° South West	Permanent Grass	Av Rainfall: 785 mm ATO: 1486 day °C FC Days: 174 Climatic Grade: 1 Exposure Grade: -	Kellaways Clays
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
17/96	6/8/96	ST 842 606	GMS/HLJ		RPT/GMS/547

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	25	HCL	10YR42	1%HR (VIS)	CDFO (7.5YR56)	NONE	-	-	-	GOOD	MVF	-	Abrupt Smooth
2	58	C	2.5Y62 10YR62	4%HR (VIS)	MDMO (7.5YR56)	NONE	MCSAB	FIRM	Moderate	GOOD*	FVF	-	Clear Smooth
3	80+	C	5Y61	<1%HR (VIS)	MDMO (7.5YR56)	NONE	MCAB	FIRM	POOR	POOR	FVF	-	-

Profile Gleyed From: 0cm (surface)

Depth to Slowly Permeable Horizon: 58cm

Wetness Class: III

Wetness Grade: 3b

Available Water Wheat: 133 mm

Potatoes: 111 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90 mm

Moisture Balance Wheat: 35 mm

Potatoes: 21 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: * porosity just 'good', borderline Subgrade 3b profile

Augered to 120cm

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 4 (ASP 65)	0°	Permanent Grass	Av Rainfall: 785 mm ATO: 1486 day °C FC Days: 174 Climatic Grade: 1 Exposure Grade: -	1st Terrace Gravels
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
17/96	6/8/96	ST 842 601	HLJ/GMS		RPT/HLJ/226

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	26	SCL	10YR42/43	NONE	FRR	NONE	-	-	-	-	CF, VF	-	Clear Smooth
2	62	HCL	10YR54	NONE	NONE	NONE	MCSAB	Friable	Moderate	Good	CVF in wormholes	-	Clear Smooth
3	85+	C	10YR53	NONE	MDFO (10YR66) CDMO (7.5YR56)	FEW	MCSAB	Friable	Moderate	GOOD	CVF in wormholes	-	-

Profile Gleyed From: 62cm

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 1

Available Water Wheat: 141 mm

Potatoes: 115 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90 mm

Moisture Balance Wheat: 43 mm

Potatoes: 25 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 1

Main Limiting Factor(s):

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 5 (ASP78E)	1° North	Permanent Grass	Av Rainfall: 785 mm ATO: 1486 day °C	Alluvium
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 174 Climatic Grade: 1 Exposure Grade: -	SOIL SAMPLE REFERENCES
17/96	6/8/96	ST 843 594	HLJ/GMS		RPT/HLJ/227

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	18	HCL	10YR32	NONE	NONE	NONE	-	-	-	-	MF+VF	-	Abrupt Wavy
2	48	C	10YR62	NONE	MDMO (10YR68)	FEW	WCPr (breaking to CSAB)	FIRM	POOR	POOR	CF+VF	-	Abrupt Wavy
3	80+	C	10YR61	NONE	MDMO (10YR68)	NONE	MCPr	FIRM	POOR	POOR	FF+VF	-	-

Profile Gleyed From: 18cm

Depth to Slowly Permeable Horizon: 18cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 123 mm

Potatoes: 100 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90mm

Moisture Balance Wheat: 25 mm

Potatoes: 10 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: Topsoil 1% off being clay

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bradford-on-Avon	Pit 6 (ASP89)	0°	Grass Ley	Av Rainfall: 785 mm ATO: 1476 day °C	Kellaways Clays
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 174 Climatic Grade: 1	SOIL SAMPLE REFERENCES
17/96	6/8/96	ST 847 595	GMS/HLJ	Exposure Grade: -	RPT/HLJ/222

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	25	SCL (MCL)	10YR43	NONE	NONE	NONE	-	-	-	-	CVF	-	Clear Smooth
2	48	C	2.5Y62	NONE	MDMO (7,5YR56)	Common	WCSAB	FIRM	POOR	Border-line (mostly small) overall <0.5	FVF	-	Clear Smooth
3	80+	C	10YR62/53	NONE	MDMO (7.5YR56)	NONE	MCAB	FIRM	POOR	<0.5	FVF	-	-

Profile Gleyed From: 25cm

Depth to Slowly Permeable Horizon: 25cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 124 mm

Potatoes: 101 mm

Moisture Deficit Wheat: 98 mm

Potatoes: 90 mm

Moisture Balance Wheat: 26 mm

Potatoes: 11 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: