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Kingsteignton

Agricultural Land Classification

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KINGSTEIGNTON

AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 161 ha of land at Kingsteignton. Field survey was based on 23 auger borings and 2 soil profile pits, and was completed in March 1999. During the survey 2 samples were analysed for particle size distribution (PSD).

2. The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in the preparation of Teignbridge Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. The published regional ALC map (MAFF 1977) shows the site at a reconnaissance scale as mainly Grade 4 with small areas of Grade 3 to the north and south. 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. An adjacent site at Penns Mount, Kingsteignton had been surveyed in 1993 (ADAS 1993). This shows Subgrade 3a limited by workability and Subgrade 3b and Grade 4 limited by gradient. The adjacent part of the current survey was Grade 4 limited by gradient. The nearby site at Teigngrace-Bovey Basin (ADAS 1994) shows Grades 1, 2, 3a and 4 with limitations due to wetness and flooding. Wetness also proved to be the primary limitation for most of the current survey.

5. At the time of survey land cover was permanent pasture, rough grazing and ploughed land. Non agricultural land which was not surveyed included clay works, industrial areas, playing fields, residential areas, a wildlife reserve, lakes and retail complexes.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1:12 500 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: Kingsteignton

Grade	Area (ha)	% Surveyed Area (29 ha)
3a	5	17
3b	6	21
4	18	62
Other land	132	
Total site area	161	

7. The agricultural land on this site has been mapped in the current survey as Subgrade 3a (good quality land), Subgrade 3b (moderate quality) and Grade 4 (poor quality). The key limitations to agricultural use are workability and wetness for Subgrade 3a and wetness and gradient for Subgrade 3b and Grade 4. 17 % of the land has been mapped as best and most versatile land.

CLIMATE

8. 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.

9. 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.

10. Climatic variables also affect the 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: Kingsteignton

Grid Reference		SX 864 732	SX 866 748
Altitude (m)		10	15
Accumulated Temperature (day °C)		1598	1592
Average Annual Rainfall (mm)		962	973
Overall Climatic Grade		1	1
Field Capacity Days		197	199
Moisture deficit (mm):	Wheat	103	101
	Potatoes	96	93

RELIEF

12. Altitude ranges from sea level at the south east of the site to 18 metres at the north west of the site with a few moderate slopes which where they occur limit the land to Grade 4 on gradient.

GEOLOGY AND SOILS

13. The underlying geology of the site is shown on the published geology map (IGS 1976) as mainly Abbrook Clay of the Bovey Formation with some Southacre Clay also of the Bovey Formation. Smaller areas of alluvium are found along Ugbrook stream in the south east corner of the site. The soils were heavily influenced by clay over the majority of the site.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW 1983) and this shows the area as mainly unsurveyed. More detailed soils information is available in the 1: 63 360 scale survey of Exeter and Newton Abbot area (SSEW 1972). This shows Southampton, Stover, Exminster and Teigngrace series, with some mixed bottom lands and again much unsurveyed land.

15. Southampton series soils are described as sandy and gravelly humus iron podsols over sandy and gravelly Bovey Beds. Stover soil series are defined as being fine loamy gleyed brown earths found on head geology from Bovey Beds and slate. Exminster soil series are summarised as clayey groundwater gley soils over esturine alluvium. Teigngrace soils are described as clayey surface water gley soils over clayey Bovey Beds.

16. The recent ALC survey found similar soils to the Stover and Exminster soil series in that they were often clayey, gleyed and slowly permeable at depth.

AGRICULTURAL LAND CLASSIFICATION

17. The distribution of ALC grades found by the current survey is shown on the accompanying 1:12 500 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.

Subgrade 3a

18. The area shown as Subgrade 3a has a moderate wetness or workability limitation. The majority of the borings had heavy silty clay loam topsoils over subsoils varying from clay to sandy textures. These profiles were generally assessed as Wetness Class I (see Appendix II). The main limitation for the majority of the ASPs was workability with 197 FCD and a heavy silty clay loam topsoil. Due to a relatively high stone content in the soil profile ASP 2 was limited to Subgrade 3a on droughtiness as well as workability. Although Pit 1 is representative of the Subgrade 3a mapping unit, it differs from the other profiles in that the lower clay subsoil was a slowly permeable layer. This profile was assessed as Wetness Class III yet with the lighter topsoil texture the final grade was still Subgrade 3a. Therefore it should be noted that the Subgrade 3a mapping unit experiences considerable soil variability.

Subgrade 3b

19. The land mapped as Subgrade 3b was found to be limited by wetness. This covers two separate areas.

20. The area of grazing around the fishing ponds to the south is mapped as Subgrade 3b. Two ASPs were assessed as Wetness Class III, Subgrade 3b with heavy clay loam topsoil, whereas a third ASP was assessed as Subgrade 3a Wetness Class I with a heavy clay loam topsoil. The soil in this area was found to be extremely variable, possibly due to disturbance resulting from previous clay extraction.

21. The second area of Subgrade 3b land is located on rising ground in the far south east of the site. The two ASPs here showed gleying and a slowly permeable layer and were assessed as Wetness Class III with heavy clay loam topsoils.

Grade 4

22. The main mapping unit in this grade, on the northern part of the site, has a severe wetness limitation. The profiles examined typically have heavy clay loam topsoils over grey and pale coloured clay subsoils. The profiles were found to be gleyed above 40 cm and had slowly permeable subsoils and were therefore assessed as Wetness Class IV. Three Wetness Class IV ASPs had lighter topsoils including medium silty clay loam and medium clay loam and were assessed as Subgrade 3b. However due to the isolated nature of these ASPs they are not mapped as a separate unit.

23. The second area of Grade 4 is south of Homefield. Three of the soil profiles examined were assessed as Wetness Class IV with gleying above 40 cm and a slowly permeable subsoil. ASP 53 had a medium silty clay loam topsoil which resulted in Subgrade 3b, whereas ASPs 44 and 43 had heavy clay loam topsoils and were assessed as Grade 4. ASPs 41 and 47 were assessed as Subgrade 3a with medium clay loam topsoil at Wetness Class III. Here the gleying did not start until below 40 cm, nonetheless slowly permeable layers were found above 80 cm. Although this area is variable and includes some better quality land it was thought appropriate to map the whole area as Grade 4, as poor quality land was dispersed across the area, so that fields could only be utilised to the level of the poorest soils within them.

26. In the far south east of the site an area is mapped as Grade 4 limited by gradient with slopes of 12° and 18 °.

27. The land previously surveyed at Penns Mount, Kingsteignton (ADAS 1993) shows Subgrade 3a limited by workability and Subgrade 3b limited by gradient. The area adjacent to the current survey was shown as Subgrade 3b on gradient and this tied in well with the current survey on the opposite side of the valley which was limited to Grade 4 on gradient.

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25 May 1999

REFERENCES

ADAS RESOURCE PLANNING TEAM, (1993) Agricultural Land Classification Survey of Penns Mount Kingsteignton. Scale 1: 10 000, Reference 73.93, ADAS Bristol.

ADAS RESOURCE PLANNING TEAM, (1993) Agricultural Land Classification Survey of Newton Abbot, Teigngrace Bovey Basin. Scale 1: 10 000, Reference 127.94, ADAS Bristol.

INSTITUTE OF GEOLOGICAL SCIENCES (1972) Sheet 325 & 339, Newton Abbot 1:50 000 series Solid and Drift edition. IGS, London.

HODGSON, J M (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe.

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, 1:250 000 scale. SSEW, Harpenden.

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

SOIL SURVEY OF ENGLAND AND WALES (1972) Sheets 325 and 339 Exeter and Newton Abbot 1: 63 360 scale. 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 (eg 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 (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe.

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, 1997).

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	**WA:**	Weakly developed Adherent	**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:

V:	Visual	**S:**	Sieved	**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' might be noted as RRC.

MANGANESE CONCRETIONS: Assessed by volume

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

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, 1997) for details.