

TEIGHNMOUTH.99

AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

	Page
INTRODUCTION	1
SUMMARY	1
CLIMATE	2
RELIEF	2
GEOLOGY AND SOILS	3
AGRICULTURAL LAND CLASSIFICATION AND MAP	3
REFERENCES	5
APPENDIX I Description of the Grades and Subgrades	6
APPENDIX II Definition of Soil Wetness Classes	8
APPENDIX III Survey Data:	9
Sample Point Location Map	
Pit Descriptions	
Boring Profile Data	
Boring Horizon Data	
Abbreviations and Terms used in Survey Data	

TEIGNMOUTH. 99

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 106 ha of land in three sites at Teignmouth Devon. Field survey was based on 41 auger borings and 2 soil profile pits, and was completed in February 1999. During the survey 3 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 3 with the steepest slopes as Grade 4 and, somewhat curiously, two areas of Grade 2 at the Buddleford site and opposite Higher Coombe Farm, both areas which the current survey shows to be Subgrade 3b limited by gradient. Part of the site had been surveyed previously (ADAS 1983) as part of the Teign Estuary study area but the results of this survey can no longer be found. The current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and therefore supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.
4. Three small sites in one survey (Teignmouth, ADAS 1993) adjacent to the current survey area had been surveyed previously to the revised guidelines. These are shown as mainly Subgrade 3b limited by gradient with Subgrade 3a limited by restricted workability.
5. At the time of survey land cover was mainly grass with some cereals and a small area of maize. Other land which was not surveyed included the playing fields at Broadmeadow, scrub on the steeper slopes above Broadmeadow and mainly residential land within the Holcombe site.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1: 15 000 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: Teignmouth 99

Grade	Area (ha)	% Surveyed Area (73 ha)
3a	15	21
3b	33	45
4	25	34
Other land	33	
Total site area	106	

7. This shows that 21% of the area was found to be best and most versatile, Subgrade 3a limited mainly by droughtiness, restricted workability and wetness. The rest of the land was found to be Subgrade 3b and Grade 4 mainly limited by gradient and wetness.

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: Teignmouth 99

Grid Reference	SX 926723	SS 946746
Altitude (m)	10	130
Accumulated Temperature (day °C)	1597	1459
Average Annual Rainfall (mm)	898	948
Overall Climatic Grade	1	1
Field Capacity Days	186	193
Moisture deficit (mm): Wheat	106	88
Potatoes	100	76

RELIEF

11. Altitude ranges from 25 metres at Broadmeadow to 135 metres above Higher Holcombe Farm. Only small areas were found with gentle and moderate slopes which are not limiting to ALC whereas the majority of all the sites were found to have steeper slopes limiting the land to Subgrade 3b or Grade 4.

GEOLOGY AND SOILS

12. The underlying geology of the site is shown on the published geology map (IGS, 1976) as Permian Teignmouth breccia. This was borne out by the current ALC survey wherever auger borings were made.

13. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1: 250 000 (SSEW 1983) as *Crediton* association which is described as well drained gritty reddish loamy soils over breccia, locally less stony and with steep slopes in places. More detailed soils information is also available in the one inch scale survey of the Soils of Exeter District (SSEW 1972). This shows *Crediton* series in the north of the Holcombe site with *Shaldon* series through much of the rest of the sites and *Rixdale* series at the Buddleford site. The current ALC survey found both the *Crediton* and *Shaldon* series to be somewhat *variable both in topsoil texture and to a lesser extent in stone content, which was found to be generally moderate, found little distinction between the two series in terms of ALC.*

AGRICULTURAL LAND CLASSIFICATION

14. The distribution of ALC grades found by the current survey is shown on the accompanying 1: 15 000 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.

Subgrade 3a

15. The area shown as Subgrade 3a was found to be somewhat variable and is confined to the gentle and moderate slopes mainly at the tops of the hills in the Holcombe site. A typical profile is illustrated by Pit 2 which found heavy clay loam topsoil at Wetness Class I indicating a limitation to Subgrade 3a because of restricted workability. However, the stone contents for each horizon were measured by sieving at this pit and also at Pit 1 were found to be around 30% in the topsoil and around 45% in the middle and lower subsoils, mainly small stones 2 mm - 2 cm. This indicates a general limitation to Subgrade 3a, also because of droughtiness.

16. However, the area shown as Subgrade 3a was found to be variable and includes isolated pockets of wetness such as are illustrated by Pit 1 which found the lower subsoil to be a slowly permeable layer so that the profile was assessed as Wetness Class III, Wetness Grade 3b. The area shown as Subgrade 3a also includes 2 borings at the eastern side of the Holcombe site with sandy clay loam topsoil and rather lower stone content indicating a marginal Grade 2 limited by droughtiness but in a small area not large enough to be mapped.

Subgrade 3b

17. Most of the area shown as Subgrade 3b was found to be limited by gradient including the sites at Buddleford and opposite Higher Coombe Farm, which had previously been shown on the published regional ALC map as Grade 2. The four fields opposite Higher Coombe Farm include very small areas with gradients of 7° or less, mainly running along the ridge parallel to the road. One of these is shown on the final ALC map, but the other was found to have clay topsoil and was therefore limited to Subgrade 3b by restricted workability.

Grade 4

18. The area shown as Grade 4 was found to be mainly limited by gradient with slopes of 12 to 18 degrees.

19. However, the area shown as Grade 4 also includes a small area of reclaimed tip at ASP 41, 44 and 45 where compaction during restoration has created a slowly permeable layer at many points in the upper subsoil leading to assessment as Wetness Class IV, Wetness Grade 4. At the time of survey this area was subject to extensive severe winter ponding.

P Barnett
Resource Planning Team
FRCA Bristol
March 1999

REFERENCES

ADAS RESOURCE PLANNING TEAM, (1993) Agricultural Land Classification Survey of Teignmouth. Scale 1: 10 000 Reference 82.93, FRCA Bristol.

INSTITUTE OF GEOLOGICAL SCIENCES (1976) Sheet 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 (1992) Sheet 325 and 339, Soils of the Exeter District, 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.

GLEYS, 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.

GLEYS: 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

<u>Degree of development</u>	WA: Weakly developed Adherent	WK: Weakly developed
	MD: Moderately developed	ST: Strongly developed
<u>Ped size</u>	F: Fine	M: Medium
	C: Coarse	VC: Very coarse
<u>Ped Shape</u>	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%		

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.