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Liskeard

Agricultural Land Classification

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Resource Planning Team
Bristol
FRCA Western Region

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LISKEARD

AGRICULTURAL LAND CLASSIFICATION SURVEY

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SUMMARY

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 343.5 ha of land in two sites to the North and South of Liskeard, Cornwall. Field survey was based on 151 auger borings and 4 soil profile pits, and was completed in May 1997. During the survey 9 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 Caradon District Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. 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. At the time of survey land cover was mainly grass for grazing with some cereals and fodder crops. Other land which was not surveyed included residential and commercial land, roads and railways, with agricultural buildings and small areas of woodland.

5. 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: Liskeard sites

Grade	Area (ha)	% Surveyed Area (278.5 ha)
3b	204.7	74
4	53.7	19
5	20.1	7
Other land	65.0	
Total site area	343.5	

6. This shows none of the land surveyed to be best and most versatile. The best of the land on both sites was found on the more gentle upper slopes and was found to be mainly limited by workability defined in the classification as a relationship between topsoil texture and the climatic characteristics of the site. This is shown as Subgrade 3b. Considerable areas of Grades 4 and 5, limited by gradient are found in the south site.

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30 July 1997

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INTRODUCTION

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CLIMATE

7. 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.

8. 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 at Table 3 indicate that there is an overall climatic limitation which limits the land to mainly Subgrade 3a, with Grade 2 in the lower lying land at the south site.

9. 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.

10. The following data is a selection from the points used.

Table 2: Climatic Interpolations: Liskeard Sites

Grid Reference		SX 252 658	SX 265 629	SX 241 634
Altitude (m)		152	140	50
Accumulated Temperature (day °C)		1454	1469	1572
Average Annual Rainfall (mm)		1386	1371	1282
Overall Climatic Grade		3a	3a	2
Field Capacity Days		271	265	254
Moisture deficit (mm):	Wheat	60	61	77
	Potatoes	41	43	64

RELIEF

11. Altitude ranges from 41 metres at Lodge Mill in the south site to 158 metres behind the Magistrates Court in the north site with mainly gentle and moderate gradients on the upper slopes, which are not limiting. However, in the south site steeper valley sides restrict the ALC grade of the land to Grades 3b, 4 and 5.

GEOLOGY AND SOILS

12. The underlying geology of the site is shown on the published geology map (IGS, 1977) as mainly Middle Devonian slates with small isolated intrusions of diabase and thin strips of alluvium in the main river valleys of the south site.

13. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as mainly Denbigh 1 Association with Denbigh 2 Association running through the centre of the south site. Both associations are similarly described as well drained fine loamy soils over slate or slate rubble, possibly associated with some shallow soils and with similar soils affected by slight seasonal waterlogging. The current survey found mainly well drained profiles characteristic of the association type.

AGRICULTURAL LAND CLASSIFICATION

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

15. Apart from the published regional ALC map (MAFF, 1977) which shows the sites at a reconnaissance scale as mainly Grade 3 with some Grade 2 south of Cartuther Barton and larger areas of Grade 4 on the steeper valley sides, both sites were previously surveyed in 1976 at a scale of 1:25 000 (ADAS, 1976). This survey, which was carried out to the previous ALC guidelines which are now superseded, shows mainly Subgrade 3a with some Subgrade 3b and Grade 4 on the valley sides.

16. Land to the east and west of the town, adjacent to the current survey sites, was surveyed in 1991, at a scale of 1:12 500 (ADAS 1991). This shows mainly Subgrade 3a on the better land with Subgrade 3b and Grades 4 and 5 on the steeper valley sides.

17. The distribution of ALC grades found by the current survey is shown on the accompanying 1:12 500 scale maps and areas are summarised in Table 1.

Subgrade 3b

18. The best of the land in both survey areas was found to be mainly heavy clay loam topsoil texture at Wetness Class 1, limited to Subgrade 3b because of restricted workability with over 250 Field Capacity Days throughout both sites. Some borings within the Subgrade 3b mapping unit were also found to be limited by gradient with slopes measured between 8 and 11°.

Grades 4 and 5

19. The extensive steeper valley sides throughout the south site are mainly limited to ALC Grade 4 if between 12 and 18° and to Grade 5 if 19° or above.

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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.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Liskeard North	Pit 1 (ASP 4)	4° N	Permanent Grass	Av Rainfall: 1386 mm ATO: 1454 day °C	Devonian Slate
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 271 Climatic Grade: 3a Exposure Grade: 1	PSD SAMPLES TAKEN
25/97	8/5/97	SX 2524 6607	PRW/PB		TS 0-25 cm HCL (S25: Z43: C32%)

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	22	HCL	7.5YR34	13% ZR < 2cm (S)	0	0	-	-	M	M	MF, VF	-	Grad smooth
2	36	HCL	7.5YR44	20% ZR (VIS)	0	0	MFSAB	Fr	G	M	MVF	-	Ab wavy
3	44	ZC	10YR56	30% ZR (VIS)	0	0	WMSAB	VFr	G	M	CVF	-	Clear wavy
4	80+	ZC	10YR64	15% > 2cm (S) 26% < 2 cm (S+D) 41% ZR	0	0	Too stony	-	M	M	VFF	-	-

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3b

Available Water Wheat: 117 mm

Potatoes: 108 mm

Moisture Deficit Wheat: 63 mm

Potatoes: 45 mm

Moisture Balance Wheat: +54 mm

Potatoes: +63 mm

Droughtiness Grade: 1 (Calculated to 100 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wk

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Liskeard South	Pit 2 (ASP 47/27)	7 ° SW	Permanent Grass	Av Rainfall:	1333 mm	Devonian slate
				ATO:	1514 day °C	
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days:	261	PSD SAMPLES TAKEN
26/97	9/5/97	SX 2568 6363	PRW/PB	Climatic Grade:	3a	TS 0-25 cm HCL (S34: Z 36: C30%)
				Exposure Grade:	1	

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	47	HCL	75YR44	27% < 2cm (S) ZR	0	0	-	-	M	M	MV, VF	-	Clear smooth
2	75	C	10YR56	4% > 2cm (S) 36% < 2cm (S+D) 40% ZR	0	0	MMSAB	Fr	M	G	FF	-	Grad smooth
3	85+	C	10YR56	60% ZR (VIS)	0	0	Too stony	-	(M)	G	VFF	-	0

Profile Gleyed From: -

Depth to Slowly Permeable Horizon: -

Wetness Class: I

Wetness Grade: 3b

Available Water Wheat: 108 mm

Potatoes: 101 mm

Moisture Deficit Wheat: 66 mm

Potatoes: 50 mm

Moisture Balance Wheat: +42 mm

Potatoes: +51 mm

Droughtiness Grade: 1 (Calculated to 100 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wk

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Liskeard South	Pit 3 (ASP 102)	4° N	Cer	Av Rainfall: 1371 mm ATO: 1469 day °C	Devonian Slate
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 265 Climatic Grade: 3a Exposure Grade: 1	PSD SAMPLES TAKEN
26/97	9/5/79	SX 2665 6329	PRW/PB		TS 0-25 cm HCL (S33: Z34: C33%)

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	30	HCL	7.5YR43	8% > 2cm (S) 24% < 2cm (S+D) 32% ZR	0	0	-	-	-	-	MF, VF	-	Ab smooth
2	95+	C	10YR53	25% > 2 cm (S) 41% < 2cm (S+D) 66% ZR	0	0	Too stony	(Fr)	(M)	G	FF, VF	-	-

Profile Gleyed From: -

Depth to Slowly Permeable Horizon: -

Wetness Class: I

Wetness Grade: 3b

Available Water Wheat: 108 mm

Potatoes: 87 mm

Moisture Deficit Wheat: 66 mm

Potatoes: 50 mm

Moisture Balance Wheat: +42 mm

Potatoes: +37 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wk

Remarks: Pit dug to 75 cm , probed to 95 cm