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**CORNWALL STRUCTURE PLAN: HATT**  
**AGRICULTURAL LAND CLASSIFICATION**

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## **CORNWALL STRUCTURE PLAN: HATT**

### **AGRICULTURAL LAND CLASSIFICATION SURVEY**

#### **SUMMARY**

The survey was carried out by ADAS on behalf of MAFF as part of its statutory role in the preparation of the Cornwall Structure Plan. The fieldwork around Hatt near Saltash was completed in September 1994 at a scale of 1:10,000. Data on climate, soils, geology and previous ALC Surveys was used and is presented in the report. The distribution of grades is detailed below and illustrated on the accompanying ALC map and summarised below. Information is correct at this scale but could be misleading if enlarged.

#### **Distribution of ALC grades: Hatt**

<b>Grade</b>	<b>Area (ha)</b>	<b>% of Survey Area</b>	<b>% of Agricultural Land (104.1 ha)</b>
3b	95.3	83.2	91.5
4	8.8	7.7	8.5
Urban	4.7	4.1	
Non Agricultural	3.9	3.4	
Agricultural Buildings	1.9	1.6	
<b>TOTAL</b>	<b>114.6</b>		

None of the land surveyed has been shown as best and most versatile. 92% of the agricultural area was found to be subgrade 3b, limited mainly by workability and 8% was found to be grade 4 limited mainly by gradient.

## 1. INTRODUCTION

An Agricultural Land Classification (ALC) Survey was carried out in September 1994 at Hatt, near Saltash on behalf of MAFF as part of its statutory role in the preparation of the Cornwall Structure Plan. The fieldwork covering 114.6 ha of land was conducted by ADAS at a scale of 1:10,000 (approximately one boring per hectare of agricultural land). A total of 119 auger borings were examined and 5 soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC maps of this area (MAFF 1970, 1973) show the grades of the site at a reconnaissance scale to be Grade 3. However, there is a band shown as Grade 2 running from West Park to Hatt House and another area shown as Grade 2 in the south of the site at Cross Park Farm, although these higher grades were not confirmed by the recent survey.

The recent survey supersedes these maps having been carried out at a more detailed level and using the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The grading takes account of the top 120 cm of the soil profile. A description of the grades used in the ALC system can be found in Appendix 2.

## 2. CLIMATE

*The grade of the land is determined by the most limiting factor present. The overall climate is considered first because it can have an overriding influence on restricting land to a lower grade despite other favourable conditions.*

Estimates of climatic variables were interpolated from the published agricultural climate dataset (Meteorological Office 1989). The parameters used for assessing overall climate are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness). The results shown in Table 1 indicate there is an overall climatic limitation over most of the site which restricts the land to Grade 2.

**Table 1: Climatic Interpolations: Hatt**

Grid Reference	SX 396 625	SX 393 623
Altitude (m)	85	57
Accumulated Temperature (day °)	1528	1560
Average Annual Rainfall (mm)	1256	1223
Overall Climatic Grade	2	2
Field Capacity Days	244	239
Moisture deficit (mm):		
Wheat	76	81
Potatoes	62	69

Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat and potatoes are also shown. These data are used in assessing the soil wetness and droughtiness limitations referred to in later sections.

## 3. RELIEF AND LANDCOVER

Altitude ranges from 25 to 85 m AOD. Upper slopes are mainly gentle to moderate convex slopes, and not limiting, whereas lower slopes and valley sides are frequently moderately steep up to 11° for Grade 3b and with several areas over 11°, limited to Grade 4 on slope.

At the time of survey, landcover was mainly grass and cereals. In previous times, and apparently since the Second World War this area, in common with others in the valley supported a considerable acreage of orchards, soft fruits and market gardening. Although some persist in other parts of the valley, only a few orchard trees remain within the survey area.

#### 4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:50,000 scale drift geology map, sheet 348 British Geological Survey 1977. This shows mainly Upper Devonian slates with a small area overlain by river gravel at the north of the site and a tiny intrusion of diabase to the north of Hatt House.

The soils were mapped by the Soil Survey of England and Wales in 1983 at a reconnaissance scale of 1:250,000 as all belonging to the Denbigh 1 Association. These are described as well drained fine loamy and fine silty soils over rock. Some similar soils have slowly permeable subsoils and slight seasonal waterlogging. There are shallow soils and some bare rock locally. This distribution was largely borne out by the current survey.

#### 5. AGRICULTURAL LAND CLASSIFICATION

The distribution of ALC grades is shown in Table 2 and on the accompanying ALC map. The information could be misleading if shown at a larger scale.

Table 2: Distribution of ALC grades: Hatt

Grade	Area (ha)	% of Survey Area	% of Agricultural Land (104.1 ha)
3b	95.3	83.2	91.5
4	8.8	7.7	8.5
Urban	4.7	4.1	
Non Agricultural	3.9	3.4	
Agricultural Buildings	1.9	1.6	
TOTAL	114.6		

##### Subgrade 3b

With around 240 Field Capacity Days, the predominantly heavy clay loam topsoil texture gives rise to Subgrade 3b at Wetness Class I, (see Appendix 3), due to restricted workability. At some profiles, colour variation appears in the weathered slate subsoil and this could be taken as gleying, which would indicate Wetness Class III, ALC Grade 4, but after consideration at a pit site, such apparently ochreous colours were considered to be local weathering of rock fragments and not true gleying.

This mapping unit includes several isolated borings where localised patches of parent material have weathered to a deeper silty clay material given rise to a slowly permeable layer and true gleying in the subsoil. Such profiles would be Wetness Class IV, ALC Grade 4, but generally have not been found in an area large enough to be delineated.

##### Grade 4

The areas shown as Grade 4 are mainly limited by slopes over 11°, although a small area with severe wetness limitation on a spring line at the northern boundary of the site has also been shown as Grade 4.

##### Other Land

Land shown as Non-Agricultural includes mainly woodland and scrub.

Among the areas shown as agricultural buildings, the area immediately to the east of Hatt Village represents a collection of foundations and hardstandings due to be absorbed by road improvements which were due to start at the time of this survey.

Other land shown as Urban includes roads, domestic buildings and gardens, also one small quarry.

Resource Planning Team  
Taunton Statutory Unit  
September 1994

## **APPENDIX 1**

### **REFERENCES**

**BRITISH GEOLOGICAL SURVEY (1977) Drift Edition, Sheet 348, Plymouth 1:50,000**

**MAFF (1970, 1973) Agricultural Land Classification Map, Sheets 186, 187, Provisional 1:63,360 scale.**

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

**METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification.**

**SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5, Soils of South West England, 1:250,000 scale.**

**ADAS Resource Planning Team, 1993. Report of ALC survey at Saltash, 1:10,000.**

## **APPENDIX 2**

### **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.

### **Descriptions of other land categories used on ALC maps**

#### **Urban**

Built-up or 'hard' uses with relatively little potential for a return to agriculture including: housing, industry, commerce, education, transport, religious buildings, cemeteries. Also, hard-surfaced sports facilities, permanent caravan sites and vacant land; all types of derelict land, including mineral workings which are only likely to be reclaimed using derelict land grants.



## **Non-Agricultural**

'Soft' uses where most of the land could be returned relatively easily to agriculture, including: private park land, public open spaces, sports fields, allotments and soft-surfaced areas on airports/airfields. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

## **Agricultural buildings**

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses. Temporary structures (eg polythene tunnels erected for lambing) may be ignored.

## **Open water**

Includes lakes, ponds and rivers as map scale permits.

## **Land not surveyed**

Agricultural land which has not been surveyed.

Where the land use includes more than one of the above landcover types, eg buildings in large grounds, and where may be shown separately. Otherwise, the most extensive cover type will usually be shown.

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

## **APPENDIX 3**

### **DEFINITION OF SOIL WETNESS CLASSES**

#### **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).

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 1256 mm	PARENT MATERIAL	
Hatt		Pit 1	3° North	Ley	ATO: 1528 day °C	Slate	
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 240	SOIL SAMPLE REFERENCES	
108/94		14/9/94	SX 398 628	PRW/HLJ	Climatic Grade: 2	RPT/PRW 118	
					Exposure Grade: -		

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	33	HCL	7.5YR44	0% >2cm 17% ZR <2cm (S+D)	None	None	-	-	-	Good	MF	-	Clear wavy
2	49	HCL	7.5YR44	3% ZR >2cm 27% ZR <2cm 30% ZR Total (S+D)	None	None	WMSAB	Friable	Good	Good	MF	-	Clear wavy
3	70+	HCL	10YR56	65% ZR Total (Vis)	None	None	-	-	Moderate (Assumed)	Good	FF	-	-

Profile Gleyed From: N/A

Depth to Slowly Permeable Horizon: N/A

Wetness Class: 1

Wetness Grade: 3b

NL336j

Available Water Wheat: 129 mm

Potatoes: 104 mm

Moisture Deficit Wheat: 78 mm

Potatoes: 66 mm

Moisture Balance Wheat: +51 mm

Potatoes: +38 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability

Remarks:

SITE NAME		PROFILE NO.	SLOPE AND ASPECT		LAND USE		Av Rainfall: 1256 mm		PARENT MATERIAL			
Hatt		Pit 2	2° W		Ley		ATO: 1528 day °C		Slate			
JOB NO.		DATE	GRID REFERENCE		DESCRIBED BY		FC Days: 240		SOIL SAMPLE REFERENCES			
108/94		15/9/94	ASP 98 SX 398 619		PRW/PB		Climatic Grade: 2		PRW 119			
						Exposure Grade: -						

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	33	HCL	10YR5/3	15% ZR Visual estimate	None	None	-	-	Moderate	Many	Many v. fine	-	Clear smooth
2	45	HCL	10YR5/4	20% ZR Visual estimate	FFFO	None	Weak Coarse Subangular Blocky	Friable	Moderate	Many	Few v. fine	-	Abrupt smooth
3	80	ZC	10YR73	10% ZR Visual estimate	MDMO	None	Weakly Coarse Prismatic	Firm	Poor	Poor	None	-	Gradual smooth
4	80+	HZCL	10YR71	50% ZR Visual	MDMO	None	Parent material	Firm	M (Assumed)	Poor	None	-	-

Profile Gleyed From: 45

Depth to Slowly Permeable Horizon: 45

Wetness Class: 4

Wetness Grade: 4

NL336j

Available Water Wheat: 128 mm

Potatoes: 101 mm

Moisture Deficit Wheat: 78 mm

Potatoes: 66 mm

Moisture Balance Wheat: +50 mm

Potatoes: +35 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 4

Main Limiting Factor(s): Wetness

Remarks:

SITE NAME Hatt		PROFILE NO. Pit 3 (ASP 94)	SLOPE AND ASPECT 5° S	LAND USE Permanent Grass	Av Rainfall: 1256 mm ATO: 1528 day °C	PARENT MATERIAL Slate	
JOB NO. 108/94		DATE 15/9/94	GRID REFERENCE SX 391 619	DESCRIBED BY PRW/HLJ	FC Days: 240 Climatic Grade: 2 Exposure Grade: -	SOIL SAMPLE REFERENCES PRW 120	

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	20	HCL	7.5YR4/4	23% <2cm Sieved ZR	None	None	-	-	Moderate	Many	Many fine	-	Abrupt smooth
2	45+	HCL (Patches of clay)	7.5YR5/4	8% >2cm 42% <2cm 50% ZR	None	None	-	-	Moderate	Many	Common fine	-	-

Profile Gleyed From: Not gleyed  
Depth to Slowly Permeable Horizon: No SPL  
Wetness Class: 1  
Wetness Grade: 3b

Available Water Wheat: 61 mm  
Potatoes: 61 mm  
Moisture Deficit Wheat: 78 mm  
Potatoes: 66 mm  
Moisture Balance Wheat: -17 mm  
Potatoes: -5 mm  
Droughtiness Grade: 3a (Calculated to 45 cm)

Final ALC Grade: 3b  
Main Limiting Factor(s): Workability

Remarks:

NL336j

SITE NAME		PROFILE NO.		SLOPE AND ASPECT		LAND USE		Av Rainfall: 1256 mm		PARENT MATERIAL			
Hatt		Pit 4 (ASP 47)		3° E		PGR		ATO: 1528 day °C		Upper Devonian Slate			
JOB NO.		DATE		GRID REFERENCE		DESCRIBED BY		FC Days: 240		SOIL SAMPLE REFERENCES			
108/94		15/9/94		SX 397 624		PB		Climatic Grade: 2		PRW 121			
								Exposure Grade: -					

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	17	MCL	75YR43	4% >2cm (S+D) 25% <2cm (S+D) 29% ZR (S+D)	0	0	-	-	-	G	MF, VF	-	Ab smooth
2	31	HCL	75YR44	2% >2cm (Vis) 26% <2cm (S+D) 28% ZR (S+D)	0	0	WMSAB	Fr	G	G	CVF	-	Ab smooth
3	60+	HCL	75YR44	80% ZR (Vis)									

Profile Gleyed From: -  
Depth to Slowly Permeable Horizon: -  
Wetness Class: 1  
Wetness Grade: 3b

Available Water Wheat: 74 mm  
Potatoes: 78 mm  
Moisture Deficit Wheat: 78 mm  
Potatoes: 66 mm  
Moisture Balance Wheat: -4 mm  
Potatoes: +12 mm  
Droughtiness Grade: 3a (Calculated to 60 cm)

Final ALC Grade: 3b  
Main Limiting Factor(s): Workability

Remarks:  
MB calc takes TS to 25 cm as HCL.

NL336j

SITE NAME		PROFILE NO.		SLOPE AND ASPECT		LAND USE		Av Rainfall: 1256 mm		PARENT MATERIAL			
HATT		Pit 5		3° N		Cereal		ATO: 1528 day °C		Slate			
JOB NO.		DATE		GRID REFERENCE		DESCRIBED BY		FC Days: 240		SOIL SAMPLE REFERENCES			
108/94		15/9/94		(ASP 114)		HLJ/PRW		Climatic Grade: 2		-			
								Exposure Grade: -					

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	35	HCL	7.5YR5/4	18% ZR <2cm (vis)	None	None	-	-	-	Good	MF	-	Clear smooth
2	75cm	C	10YR7/6	36% <2cm ≅ 1% >2cm Sieved	Common 10YR6/8 and 10YR6/2	None	Weak Medium Subangular Blocky	Friable	Moderate		Few fine	-	Abrupt smooth
3	75+	C	10YR5/3	55% Visual estimate based on other pits measured	None	None	-	-	Moderate	Many	-	-	-

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: 1

Wetness Grade: 3b

NL336j

Available Water Wheat: 122 mm

Potatoes: 102 mm

Moisture Deficit Wheat: 78 mm

Potatoes: 66 mm

Moisture Balance Wheat: +44 mm

Potatoes: +36 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability

Remarks:

Mottling in 2nd Horizon gives appearance of gleying but dominant matrix colour is neither pale nor grey and most mottles are associated with weathering rock.