

8FCs 6484

89/94

**Devon Structure Plan: South Hams  
Land at Lee Mill  
Agricultural Land Classification**

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**DEVON STRUCTURE PLAN: SOUTH HAMS  
LAND AT LEE MILL**

**AGRICULTURAL LAND CLASSIFICATION**

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**DEVON STRUCTURE PLAN: SOUTH HAMS  
LAND AT LEE MILL**

**AGRICULTURAL LAND CLASSIFICATION SURVEY**

**SUMMARY**

The reconnaissance scale survey was carried out by ADAS on behalf of MAFF as part of its statutory role in the preparation of the Devon Structure Plan. The fieldwork at Lee Mill was completed in November 1994 at a scale of 1:25,000. Data on climate, soils, geology and from previous Agricultural Land Classification (ALC) Surveys was used and is presented in the report. The distribution of grades is shown on the accompanying ALC map and summarised below. Information is correct at this scale but could be misleading if enlarged.

**Distribution of ALC grades: Lee Mill**

Grade	Area (ha)	% of Survey Area	% of Agricultural Land	
3b	324.1	69.0	91.7	
4	29.4	6.3	8.3	
Urban	66.3	14.1	0.0	
Non Agricultural	40.7	8.7	0.0	
Agricultural Buildings	5.0	1.1	0.0	
Open Water	3.7	0.8	0.0	
TOTAL	469.2	100.0	100.0	(353.5 ha)

The majority of the site is mapped as Subgrade 3b. The soils are mainly well drained heavy clay loams over clay with weathered slate in the subsoils. Within the Subgrade 3b mapping unit there are also areas with moderate wetness and gradient limitations. The Grade 4 land in the valleys has severe wetness limitations, while the other areas of Grade 4 land have severe limitations due to gradient. *There is no "best and most versatile" land in the survey area.*

## 1. INTRODUCTION

A reconnaissance scale Agricultural Land Classification (ALC) Survey was carried out in November 1994 at Lee Mill on behalf of MAFF as part of its statutory role in the preparation of the Devon Structure Plan. The fieldwork covering 469.2 ha of land was conducted by ADAS at a scale of 1:25,000 with approximately one boring per 4 hectares of agricultural land. A total of 96 auger borings were examined and 4 soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC map of this area (MAFF 1973) shows the grades of the site at a reconnaissance scale. This showed most of the agricultural land as Grade 3, with Grade 4 land in the River Yealm valley and its tributary valleys.

The area was also surveyed in 1975 at a scale of 1:50,000 as being Subgrade 3a and 3b on the higher land, with Subgrade 3c and Grade 4 land in the valley bottoms.

The recent survey supersedes this map 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 which restricts the land to Grade 2 in the main valleys and Subgrade 3a on the higher land.

**Table 1: Climatic Interpolations: Lee Mill**

Grid Reference	SX 602562	SX 606572
Altitude (m)	50	75
Accumulated Temperature (day °)	1567	1537
Average Annual Rainfall (mm)	1317	1393
Overall Climatic Grade	2	3a
Field Capacity Days	256	269
Moisture deficit (mm):		
Wheat	85	77
Potatoes	74	64

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

The site occupies the River Yealm valley and the surrounding hills which are variable in gradient. The survey area rises gently from 45 m to 112 m AOD. At the time of survey the fields were under some cereal cultivation but mainly pasture and ley grass.

#### 4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:50,000 scale drift geology map, sheet 349, Institute of Geological Sciences 1974.

Most of the site is underlain by Devonian Slates, with the slate to the north of Yardeel Moor being from the Upper Devonian Era and to the south from the Middle Devonian Era. There is alluvium in the valleys together with small areas of river gravel and head deposits.

The soils were mapped by the Soil Survey of England and Wales in 1983 at a reconnaissance scale of 1:250,000.

This showed that most of the site consists of soils from the Denbigh 1 Association which are described as being well drained fine loamy and fine silty soils over rock. Some similar soils with slowly permeable subsoils and slight seasonal waterlogging and shallow soils and bare rock may be found locally. Along the valley bottom of the River Yealm is an area of soils from the Alun Association which are described as being deep, stoneless, permeable, coarse loamy soils with some finer loamy soils variably affected by groundwater. Deposits of gravel may be underlying in places. Around Woodburn Farm and Fardel Bridge is a small area of soils from the Everingham Association which are described as deep, stoneless, permeable, fine sandy soils with some bleached sub-surface horizons, where groundwater is controlled by ditches.

The soils found during the recent survey were similar to those of the Denbigh 1 and Alun Associations. There were heavy clay loams over clay and weathered slate which were either well drained or only had a slight wetness problem on the higher land. While in the valley floors the soils were deeper and in places were poorly drained with slowly permeable subsoils.

#### 5. AGRICULTURAL LAND CLASSIFICATION

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

**Table 2: Distribution of ALC grades: Lee Mill**

Grade	Area (ha)	% of Survey Area	% of Agricultural Land	
3b	324.1	69.0	91.7	
4	29.4	6.3	8.3	
Urban	66.3	14.1	0.0	
Non Agricultural	40.7	8.7	0.0	
Agricultural Buildings	5.0	1.1	0.0	
Open Water	3.7	0.8	0.0	
TOTAL	469.2	100.0	100.0	(353.5 ha)

##### Subgrade 3b

Over 90% of the agricultural land was mapped as Subgrade 3b. The soils were heavy clay loams, either to depth or in places over clay, with negligible stone contents. On the flat valley floors the subsoils were gleyed in places and these soils were assessed as Wetness Class II (see Appendix 3) with a moderate wetness limitation. Elsewhere the profiles were assessed as Wetness Class I with a moderate workability limitation.

##### Grade 4

The areas of Grade 4 land can be split into two units. The valley floors have a severe wetness problem caused by slowly permeable subsoils below shallow topsoils which leads to the profiles being assessed as Wetness Classes III, IV and V depending on the depth to the slowly

permeable layer. The other areas are where the steep gradients severely restrict the variety of agricultural machinery that can be safely used.

#### **Other Land**

The survey area includes several areas of woodland which are mapped as non-agricultural land. The village of Lee Mill and Lee Mill Industrial Estate are shown as urban.

Resource Planning Team  
Taunton Statutory Unit  
December 1994

## **APPENDIX 1**

### **REFERENCES**

**INSTITUTE OF GEOLOGICAL SCIENCES (1974)** Drift Edition, Sheet 349, Ivybridge, 1:50,000.

**MAFF (1973)** Agricultural Land Classification Map, Sheet 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.

## **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).

# SOIL PLASTICITY RECORDING SHEET

ANNEX 2

## SITE DATA

<u>Grid Ref</u> SX 65 NW	<u>Site Name</u> Lee Mill	<u>LPA</u> Devon County
<u>AAR</u> 1393	<u>ATO</u> 1537	<u>FCD</u> 269
	<u>MD (wheat)</u> 77	<u>MD (potatoes)</u> 64

## SOIL PIT DATA

<u>PIT ONE</u> SX 612 565 SOIL SERIES Denbigh 1				<u>PIT TWO</u> SX 508 574 SOIL SERIES Denbigh 1			<u>PIT THREE</u> SX 544 560 SOIL SERIES Denbigh 1		
DEPTH	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS	TEXTURE	PLASTIC Y/N	COMMENTS
10 cm	HCL	N		HCL	N		HCL	N	
20 cm	HCL	N		HCL	N		HCL	N	
30 cm	HCL	N		HCL	N		HCL	N	
40 cm	HCL	N		HCL	N		HCL	N	
50 cm	-	N	Bedrock	-	N	Bedrock	C	Y	
60 cm	-	N	"	-	N	"	C	Y	

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SITE NAME Lee Mill		PROFILE NO. Pit 1	SLOPE AND ASPECT 2° North	LAND USE Non-Agric	Av Rainfall: 1393 mm ATO: 1537 day °C FC Days: 269 Climatic Grade: 3a Exposure Grade: 1	PARENT MATERIAL Mid-Devonian Slate
JOB NO. 89/94		DATE 16/11/94	GRID REFERENCE SX 612 565	DESCRIBED BY HLJ		SOIL SAMPLE REFERENCES RPT/HLJ/104

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	10YR44	10% HR Total (vis)	none	none	-	-	-	G	MF + VF	-	Clear smooth
2	42	HCL	7.5YR64	40% Total (vis)	none	nonc	WFSAB	Friable	G	G	CF + VF	-	Clear irregular
3	120	C	7.5YR63	65% ZR Total (vis)	none	none	Determined by stones	-	M (assumed)	Good Fissures	FVF	-	-

Profile Gleyed From: N/A  
Depth to Slowly Permeable Horizon: N/A  
Wetness Class: I  
Wetness Grade: 3b

NL336k

Available Water Wheat: 121 mm  
Potatoes: 100 mm  
Moisture Deficit Wheat: 77 mm  
Potatoes: 64 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:  
Clean, open face in hill side. Bands (8-12 cm) of quartz in slate.

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 1393 mm	PARENT MATERIAL
Lee Mill		Pit 2	2° North	Ley	ATO: 1537 day °C	Upper Devonian Slate
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 269	SOIL SAMPLE REFERENCES
89/94		17/11/94	(ASP 35) SX 508 574	NAD + HLJ	Climatic Grade: 3a	none
					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	23	HCL	10YR43	10% HR Total (vis)	none	none	-	-	-	Good	CF+VF	-	Clear smooth
2	50	HCL	10YR44	17% >2cm (S) HR 20% >2cm (vis) HR 37% HR Total	none	none	(WFSAB) Determined by stones	Friable	G	Good	FVF	-	Clear smooth
3	80+	HCL	10YR46	40% ZR Total (vis)	none	none	(WFSAB) Determined by stones	Friable	G	Good	FVF	-	-

Profile Gleyed From: N/A

Depth to Slowly Permeable Horizon: N/A

Wetness Class: I

Wetness Grade: 3b

NL336k

Available Water Wheat: 156 mm

Potatoes: 114 mm

Moisture Deficit Wheat: 77 mm

Potatoes: 64 mm

Moisture Balance Wheat: 79 mm

Potatoes: 50 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: 1393 mm		PARENT MATERIAL			
Lee Mill		Pit 3	3° North		Ley		ATO: 1537 day °C		Mid-Devonian Slate			
JOB NO.		DATE	GRID REFERENCE		DESCRIBED BY		FC Days: 269		SOIL SAMPLE REFERENCES			
89/94		17/11/94	SX 594 560 (ASP 95)		NAD/PB		Climatic Grade: 3a		None			
							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	25	HCL	7.5YR44	5% ZR Total	None	None	-	-	-	G	MF+VF	-	Clear smooth
2	50	HCL	10YR44	9% >2cm (S) 36% <2cm (S+D) 45% ZR (S+D)	None	None	WMSAB	Friable	G	G	MF+VF	-	Clear irregular
3	100+	HC	10YR54/53	1% >6cm (S) HR 1% >2cm (S) ZR 38% <2cm ZR (S+D) 40% ZR Total (S+D)	None	Few	Determined by stones	Friable	M (assumed)	G (Fissures)	CF+VF	-	-

Profile Gleyed From: N/A

Depth to Slowly Permeable Horizon: N/A

Wetness Class: I

Wetness Grade: 3b

NL336k

Available Water Wheat: 129 mm

Potatoes: 107 mm

Moisture Deficit Wheat: 77 mm

Potatoes: 64 mm

Moisture Balance Wheat: 52 mm

Potatoes: 43 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability

Remarks:

Weathered rock in H3 gives ochreous colours.

SITE NAME Lee Mill		PROFILE NO. Pit 4	SLOPE AND ASPECT 1° South	LAND USE PGR	Av Rainfall: 1393 mm ATO: 1537 day °C	PARENT MATERIAL Upper Devonian Slate	
JOB NO. 89/94		DATE 17/11/94	GRID REFERENCE SX 508 576 (ASP 26)	DESCRIBED BY HLJ, NAD	FC Days: 269 Climatic Grade: 3a Exposure Grade: 1	SOIL SAMPLE REFERENCES RPT/NAD/162	

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	10YR52	HZCL	2% HR Total (vis)	FDFO 2.5YR46	None	-	-	-	G	CF+VF	-	Abrupt smooth
2	50	0.5Y61	C	2% HR Total (vis)	CDMO 10YR68	None	WCSAB	Friable	M	P	FVF	-	Clear smooth
3	70+	2.5Y61	ZC	10% ZR Total (vis)	MDMO 10YR68	None	WCSAB	Friable	M	P	FVF	-	-

Profile Gleyed From: 25 cm  
Depth to Slowly Permeable Horizon: 25 cm  
Wetness Class: V  
Wetness Grade: 4

NL336k

Available Water Wheat: 140 mm  
Potatoes: 114 mm  
Moisture Deficit Wheat: 77 mm  
Potatoes: 64 mm  
Moisture Balance Wheat: 63 mm  
Potatoes: 50 mm  
Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 4  
Main Limiting Factor(s): Wetness

Remarks:  
HR in H<sub>2</sub> is Quartz blocks