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SOUTH HAMS BRIXTON TO MODBURY

AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1 This report presents the findings of a reconnaissance Agricultural Land Classification (ALC) survey of 1684 ha of land in four sites from Brixton to Modbury in the South Hams District of Devon The sites are all adjacent and share similar if not identical climate geology and soil types Therefore the limitations to land quality are also similar and the four sites are reported in a combined volume so that soil profile pits for each site which are mostly relevant to all sites may be cross referenced They are described in Appendix III Field survey was based on 560 auger borings and 11 soil profile pits and was completed in November 1998 During the survey 30 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 Devon Structure Plan and in the preparation of the South Hams 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

SUMMARY

4 The distribution of ALC grades is shown on the accompanying 1 20 000 scale ALC maps 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 tables below

Table 1 Distribution of ALC grades Brixton

Grade	Area (ha)	% Surveyed Area (194 5 ha)
3a	28 1	14
3b	145 2	75
4	20 5	11
5	0 7	0
Other land	65 7	
Total site area	260 2	

5 *This shows that 15% of the Brixton site was found to be best and most versatile* Subgrade 3a limited by restricted workability The rest of the area was found to be mainly Subgrade 3b limited by workability wetness and gradient with smaller areas of Grade 4 limited mainly by gradient

Table 2 Distribution of ALC grades Yealmpton

Grade	Area (ha)	% Surveyed Area (513 7 ha)
3a	122 6	24
3b	310 2	60
4	71 8	14
5	9 1	2
Other land	94 9	
Total site area	608 6	

6 This shows that 24% of the Yealmpton site was found to be best and most versatile Subgrade 3a limited mainly by restricted workability and occasionally by wetness The rest of the area was found to be mainly Subgrade 3b limited by restricted workability in several places by gradient and occasionally by wetness The Grade 4 was found to be limited mainly by gradient and wetness and the small areas of Grade 5 were found to be severely limited by gradient

Table 3 Distribution of ALC grades Ermington

Grade	Area (ha)	% Surveyed Area (344 2 ha)
3a	36 8	11
3b	240 2	70
4	63 0	18
5	4 2	1
Other land	54 5	
Total site area	398 7	

7 This shows that 11% of the Ermington site was found to be best and most versatile This was Subgrade 3a limited mainly by restricted workability The rest of the land was found to be mainly Subgrade 3b limited by workability wetness and gradient with some Grade 4 limited by wetness and gradient and smaller areas of Grade 5 limited by gradient

Table 4 Distribution of ALC grades Modbury

Grade	Area (ha)	% Surveyed Area (365 4 ha)
3a	34 5	9
3b	234 2	64
4	94 3	25
5	2 4	1
Other land	51 1	
Total site area	416 5	

8 This shows that 9% of the Modbury site was found to be best and most versatile Subgrade 3a limited by restricted workability The rest of the area was found to be mainly Subgrade 3b limited by workability wetness and gradient and Grade 4 limited by wetness and gradient

CLIMATE

9 Estimates of climatic variables for each 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 sites are given in the relevant section

10 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 Tables 5 to 8 indicate that there can be an overall climatic limitation which limits the land to Grade 2 This is described in further detail in the relevant sections

11 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 A critical boundary of 225 FC Days was found to run through the south of each site and closely following contours typically at around 40 m altitude although this varied from site to site

BRIXTON SITE

12 The published regional ALC map (MAFF 1977) shows the site as mainly Grade 3 with a large area of Grade 2 to the north and west of Brixton village Smaller areas of Grade 4 are shown following the sides of the main valleys

13 Previous ALC surveys adjacent to the north of this site (ADAS 1989 1993 and 1994) found mainly Subgrade 3b limited by restricted workability and wetness with smaller areas of Subgrade 3a limited by workability where below the 225 FC Day boundary

14 At the time of survey landcover was grass for beef and sheep with cereals linseed and a large area of fallow grass in the east of the site An area of young woodland plantation to the north of Dodovens Farm appeared to be intended for Christmas Trees with Norway Spruce and noble fir at close spacing and so was included in the ALC survey as this would be regarded as an agricultural crop Other land which was not surveyed included many scattered blocks of woodland the north side of Brixton village roads and other residential land

Climate

15 The following data is taken to represent the site

Table 5 Climatic Interpolations Brixton Site

Grid Reference		SX 563 524	SX 552 528
Altitude (m)		42	85
Accumulated Temperature (day °C)		1578	1529
Average Annual Rainfall (mm)		1141	1240
Overall Climatic Grade		1	2
Field Capacity Days		225	239
Moisture deficit (mm)	Wheat	93	81
	Potatoes	83	68

16 The 225 FC Days boundary was found approximately to follow the contours ranging from 55 m in the west of this site to 45 m in the east

Relief

17 Altitude ranges from 10 m at the lowest point in the river valley to the east of Brixton to 85 m at Wollaton Cross to the north of the village Although the topography is continually undulating slopes on the higher land are mainly gentle to moderate and not limiting but with extensive and long stronger slopes limited to Subgrade 3b frequently becoming moderately steep over shorter lengths on the steeper valley sides which are limited to Grade 4

Geology and Soils

18 The underlying geology of the site is shown on the published geology map (IGS 1974) as mainly Middle Devonian slates with some igneous tuffs and schalsteins mainly in the south of the site The current survey found little significant distinction between these two main deposits with considerable variation being exhibited by the profiles developed on the slate ranging from relatively shallow profiles of heavy clay loam over slate rock as at Pit 1 to occasional deeper profiles with slowly permeable clay developed from the weathering of softer slates as at ASP 30 Areas shown as underlain by the igneous deposits may have been more generally freely draining and more brightly coloured reddish brown and red but were also found to exhibit a range of topsoil textures including clay

19 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 in the west of the area with Trusham Association in the east and north of the area Denbigh 1 Association is described as well drained fine loamy and fine silty soils over rock with similar soils having slowly permeable subsoils and slight seasonal waterlogging and shallow soils locally Trusham Association is described as mainly well drained fine loamy soils over deeply weathered rock developed on basic igneous and metamorphic deposits This was largely borne out by the current survey although the distribution of profiles fitting the description for Trusham

Association was found to be mainly confined to the area shown as igneous on the published geology map This is considerably smaller than the area shown as Trusham Association on the published soils map

Agricultural Land Classification

20 The distribution of ALC grades found by the current survey is shown on the accompanying 1 20 000 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

21 The area shown as Subgrade 3a was found to be confined to the area with less than 225 FC Days as indicated by the climatic data where heavy clay loam topsoil was found at Wetness Class I This is limited only by restricted workability and such profiles are illustrated by Pit 1 However it should be noted that PSD analyses at both Pit 1 and ASP 24 show that the heavy clay loam topsoil can be borderline to clay with clay contents of 34-35%

22 The boundaries of the area shown as Subgrade 3a appear to be somewhat unusual as they are determined in general by the 225 FC Days climatic boundary but interrupted by valley sides limited by gradient

Subgrade 3b

23 The area shown as Subgrade 3b was found mainly above the 225 FC Day boundary where it is limited mainly by restricted workability with heavy clay loam topsoil even at Wetness Class I Such profiles would be similar to that illustrated by Pit 1

24 Several observations were also found to be limited by gradient and a few by wetness where Wetness Class II

25 A considerable area in the east of the site below approximately 45 m altitude is all shown as Subgrade 3b despite being less than 225 FC Days and with no evidence of wetness in most of the profiles examined Much of the area including ASPs 48 49 and 59 was found to be just over 7° gradient and much of the rest including ASPs 50 55 57 and 60 were considered to have clay topsoil and this was confirmed by PSD analysis at ASP 50 which found 38% clay

Grade 4

26 Most of the area shown as Grade 4 was found to be limited mainly by gradient with slopes of 12 18°

27 The presence of slowly permeable clay in the subsoil leads to assessment as Wetness Class III or IV indicating Wetness Grade 4 with heavy clay loam topsoils but the only area mapped as such is around ASP 68 to 69 Such conditions were also found at ASPs 30 and 40 but these were also considered to represent small isolated patches of clay not large enough to map Similar small patches of Grade 4 may exist within the area shown as Subgrade 3b and not identified by this survey

Grade 5

28 The one small area of Grade 5 was also found to be limited by gradient with slopes in excess of 18°

YEALMPTON SITE

29 The published regional ALC map (MAFF 1977) shows the site at a reconnaissance scale and to guidelines which have now been superseded as mainly Grade 3 with small areas of Grade 4 but also two sizeable patches of Grade 2 one to the west of Yealmpton Village and the other to the east of Orchard Farm in the east of the site The latter is somewhat difficult to explain in view of the distinctly poor grades found in that area by the current survey

30 The site had not been surveyed previously but an earlier survey at Blackpool adjacent to the north west corner of the current site (ADAS 1994) found mainly Subgrade 3b limited by restricted workability and wetness with small areas of Grade 4 limited by gradient and wetness

31 At the time of survey landcover was mainly cereals with a large area of linseed around Bedpark Plantation and grass for beef sheep and horses Other land which was not surveyed included mainly woodland residential land including Lyneham House and grounds farm buildings roads and the airstrip at Treby Farm

Climate

32 The following data is taken to represent the site

Table 6 Climatic Interpolations Yealmpton

Grid Reference		SX 596 522	SX 585 527	SX 585 533
Altitude (m)		25	70	115
Accumulated Temperature (day °C)		1597	1545	1494
Average Annual Rainfall (mm)		1085	1222	1337
Overall Climatic Grade		1	2	3a
Field Capacity Days		218	238	255
Moisture deficit (mm)	Wheat	99	86	74
	Potatoes	92	74	59

33 The critical climatic boundary of 225 FC days on this site was found to be closely related to altitude ranging from around 50 m in the west to just below 40 m in the east of the site

Relief

34 Altitude ranges from 15 m in the river valley in the west of the site to 115 m on the airstrip at Treby Farm Slopes are mainly gentle to moderate and not limiting but there are also considerable areas of long stronger slopes and the site is generally undulating dissected by river valleys with shorter moderately steep slopes becoming steep in the west

Geology and Soils

35 The underlying geology of the site is shown on the published geology map (IGS 1974) as mainly Middle Devonian slate with two bands of igneous schalsteins and tuffs running from west to east through the site On this site medium clay loam topsoils were found among the stony deposits occupying the highest ground on ridges through the areas shown as igneous schalsteins and tuffs However these lighter textured topsoils did not extend throughout the area shown as igneous and in these other parts there was little to distinguish topsoil texture from the slate deposits elsewhere

36 Soils were mapped by the soil survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as mainly Trusham and Denbigh 2 Associations Trusham Association is described as well drained fine loamy soils over deeply weathered deposits of basic igneous and metamorphic rock Denbigh 2 Association is described as well drained fine loamy soils over slate or slate rubble with some fine loamy soils variably affected by groundwater While the current survey found soils matching these descriptions the distribution of Trusham Association was perhaps less widespread than indicated on the published soils map and more closely confined to the areas shown as igneous deposits on the published geology map

Agricultural Land Classification

37 The distribution of ALC grades found by the current survey is shown on the accompanying 1 20 000 scale map and areas are summarised in Table 2 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

38 Much of the area shown as Subgrade 3a is confined to land with less than 225 FC Days where generally heavy clay loam topsoil textures were found at Wetness Class I or II Pit 3 represents the relatively few observations which found medium clay loam topsoil at Wetness Class II Topsoils in the area to the west of Yealmpton village and around ASP 100 were found to be somewhat heavier perhaps even borderline to clay in texture although PSD analyses at ASP 2 and ASP 100 confirmed heavy clay loam The area shown as Subgrade 3a

includes soils developed on alluvial deposits in the valley of the River Yealm at ASP 75 77 and ASP 196 Due to its variable nature it is possible that this area also includes smaller patches of Subgrade 3b limited by wetness which were not identified during this reconnaissance survey

39 Two other large areas of Subgrade 3a are shown above the 225 FC Day boundary at ASP 21 to 69 and at ASP 167 to 212 These were found to have generally medium clay loam textures in a frequently stony topsoil This was confirmed by PSD analyses at 5 points including Pits 1 and 5 although Pit 1 was found to be borderline to heavy clay loam However these areas are not consistently homogenous and although the majority of observations meet the ALC criteria for Subgrade 3a the areas overall should be regarded as marginal They both include stony patches at the tops of hills and also isolated borings limited to Subgrade 3b by wetness such as ASP 20 which was found to be Wetness Class III and ASP 216 which was found to be Wetness Class II They are reported by the local farmers concerned to be more difficult to work because of the stony patches which restrict the choice of crops and give noticeably lower yields than their ALC grade would suggest The high stone content even though in small patches within the larger field is reported to prevent the growing of potatoes to make cultivations for cereals difficult and to reduce the yield of cereals These reports were investigated by supplementary auger borings at ASP 216 and 217 and by sieving the topsoil at other points sited on the most stony knolls in the area These found topsoil stone > 2 cm contents of 24% and 32% which are well within the range for Subgrade 3b but by visual assessment of recently worked ground where topsoil stones are readily visible such conditions would only apply to the few small areas each extending to 0 1 to 0 5 ha Pits 1 and 5 were sited in moderately stony areas and found comparable stone contents of 4% and 5% respectively which would be similar to the majority of auger borings in these areas and otherwise confirmed Subgrade 3a at these points

40 The area of Subgrade 3a shown around ASP 147 is believed to extend just into the area of Subgrade 3b shown on the adjacent survey at Blackpool (ADAS 1994) but was not shown on the previous survey as the area would have been insignificant

Subgrade 3b

41 The area shown as Subgrade 3b was found in the area with more than 225 FC Days and mainly limited by restricted workability with heavy clay loam topsoil at Wetness Class I or by wetness with mainly heavy clay loam topsoil at Wetness Class II with gleying evident between 40 and 70 cm

42 The area shown as Subgrade 3b also includes extensive long slopes of 8 11° indicating a primary limitation due to gradient

43 Within the area shown as Subgrade 3b there are several isolated borings found to be limited by wetness to Grade 4 These showed a slowly permeable clay layer in the middle or lower subsoil and although included within the area shown as Subgrade 3b were considered to represent profiles which may also occur elsewhere within the area although not revealed by the current reconnaissance survey

Grade 4

44 Where several Grade 4 profiles limited by wetness have been found together these have been shown as a Grade 4 mapping unit These are around ASP 102 ASP 37 ASP 139 and ASP 111 These are illustrated by Pit 2 at ASP 37 which found Wetness Class III and Pit 4 at ASP 136 which found Wetness Class IV These pits also illustrate the range of topsoil textures which can be found within this mapping unit

45 The largest area of Grade 4 limited by wetness shown around ASP 139 appears to coincide with the large area of Grade 2 shown on the published Regional ALC map This is difficult to explain as the Grade 4 shown by the current survey contains 7 ASP observations all Grade 4 with convincing SPLs and confirmed by Pit 4 which in fact found clay topsoil and therefore was Grade 5

46 Other areas shown as Grade 4 are limited by gradient with slopes of 12 to 18 degrees

Grade 5

47 Small areas of Grade 5 limited by gradient were found on the steepest slopes particularly in the west of the site

ERMINGTON SITE

48 The published Regional ALC Map (MAFF 1977) shows the site at a reconnaissance scale as mainly Grade 3 with smaller areas of Grade 4 on the steepest slopes and in some valley bottoms particularly along the Long Brook valley The current survey uses the revised guidelines and criteria for grading the quality of agricultural land and therefore supersedes the previously published information The site had not previously been surveyed in any detail

49 There is no adjacent recent ALC survey

50 At the time of survey landcover was mainly grass for beef particularly suckler cows and sheep also cereals particularly at Hollowcombe and a small area of linseed in the east of the site Other land which was not surveyed was mainly woodland including some newly planted woodland residential land roads and farm buildings

Climate

51 The following data is taken to represent the site

Table 7 Climatic Interpolations Ermington

Grid Reference		SX 632 519	SX 629 532	SX 629 522
Altitude (m)		15	95	25
Accumulated Temperature (day °C)		1608	1516	1596
Average Annual Rainfall (mm)		1082	1278	1117
Overall Climatic Grade		1	2	1
Field Capacity Days		219	249	225
Moisture deficit (mm)	Wheat	100	79	97
	Potatoes	92	66	89

52 At this site the 225 FC Day boundary was found to be mainly confined to the valley of the River Erme ranging from around 25 m to around 40 m

Relief

53 Altitude ranges from around 5 m at the lowest point on the River Erme to almost 120 m above Hollowcombe Farm While much of the land has gentle and moderate slopes which are not limiting the site is generally undulating with incised river valleys and long hill slopes where strong to steep slopes can limit the ALC grade to Subgrade 3b Grade 4 or even Grade 5 in the several places where short steep slopes are found

Geology and Soils

54 The underlying geology of the site is shown on the published geology map (IGS 1974) as mainly Middle Devonian slate with smaller areas of igneous schalsteins and tuffs some alluvium particularly in the valley of the River Erme and an extensive area of Staddon Grits comprising grits and slates underlying much of the hill on which Ermington Wood is found This was largely borne out by the current survey which found the areas shown as igneous schalsteins and tuffs to be characterised by generally brighter and redder colours if not by any consistent distinction in texture The area shown as Staddon Grits was found to be mostly limited by gradient but at the top of the hill stony and frequently impenetrable borings were found to have mostly lighter topsoil textures and have been mapped as Subgrade 3a

55 Soils were mapped by the soil survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as mainly Denbigh 2 and Trusham Associations Denbigh 2 Association is described as well drained fine loamy soils over slate or slate rubble whereas Trusham Association is described as comprising well drained fine loamy soils developed on deeply weathered basic igneous and metamorphic rock This was largely borne out by current survey but the published information does not distinguish the area of stony soils developed on Staddon Grits and these were found to be significantly different from the normal range of Trusham Association profiles particularly in relation to stoniness and topsoil texture

Agricultural Land Classification

56 The distribution of ALC grades found by the current survey is shown on the accompanying 1 20 000 scale map and areas are summarised in Table 3 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

57 The survey shows two areas of Subgrade 3a The first was found below the 225 FC Day boundary including several borings on the lower slopes with heavy clay loam topsoil at Wetness Class I limited by restricted workability or occasionally by wetness if found to be Wetness Class II with gleying evident in the lower subsoil Soils in the valley bottom are developed on alluvium and were found to be more variable including profiles limited by wetness where ground water is evident and also profiles limited by droughtiness where developed on grits and gravel The latter are illustrated by Pit 2 which was sited at the centre of the most obvious gravel mound and was found to be just into Subgrade 3b on droughtiness

59 The other area shown as Subgrade 3a was found at the top of the hill above Ermington Wood in a narrow strip where not limited by gradient Although several of the borings in this area were impenetrable to the auger at around 40 cm a detailed investigation of ASP 74 at Pit 3 found this profile to be only limited by workability as although the area is above the 225 FC Day boundary topsoil texture was found to be medium clay loam with only 23% clay and droughtiness Grade 2 when calculated to 120 cm and using stone contents assessed by sieving Another PSD analysis at ASP 59 found only 15% clay but this was considered to be perhaps somewhat extreme in relation to other borings on the same deposit

Subgrade 3b

60 Much of the area shown as Subgrade 3b was found to be limited by restricted workability with heavy clay loam topsoil at Wetness Class I and above the 225 FC Day boundary These are illustrated by Pit 1 at Modbury and Pit 5 at Yealmpton Other similar profiles were found to be limited also by gradient

61 Many of the borings in the area shown as Subgrade 3b were found to be Wetness Class II with heavy clay loam topsoil normally with gleying evident in the subsoil between 40 and 70 cm but with no SPL These are illustrated by Pit 2 at Modbury

62 Scattered and isolated borings found to have a slowly permeable layer in the lower subsoil were identified as Wetness Class III Wetness Grade 4 with heavy clay loam topsoil but their occurrence was generally taken to represent small scattered areas with slowly permeable clay derived from the weathering of the slate and these have been included within the Subgrade 3b mapping unit In the large basin around Hollowcombe Farm several such borings were found at ASP 2 3 and 13 possibly indicating a somewhat more general distribution although this could not be confirmed by the intensity of borings in this reconnaissance survey and the area shown as Grade 4 has been confined perhaps somewhat schematically to the lower slopes of this basin

Grade 4

63 Two larger areas of Grade 4 were found to be limited by wetness with mainly heavy clay loam topsoils at Wetness Class III or IV with slowly permeable layers in the lower or middle subsoils These are illustrated by Pit 1 which shows Wetness Class III and also by Pit 4 at Yealmpton which shows Wetness Class IV where the slowly permeable layer starts in the middle subsoil with gleying evident above 40 cm

64 Other areas shown as Grade 4 were found to be limited by gradient with slopes of 12 to 18°

Grade 5

65 The three small areas of Grade 5 are all limited by gradient with slopes just over 20°

MODBURY SITE

66 The published regional ALC map (MAFF 1997) shows the site at a reconnaissance scale as mainly Grade 3 with some Grade 4 on the main river valleys The site had not been surveyed previously and there is no previous ALC survey adjacent to this site The current survey uses the Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF 1988) and therefore supersedes the previously published information Grade descriptions are summarised in Appendix I

67 At the time of survey land cover was mainly grass for beef and sheep with very small areas in cereals and maize Other land which was not surveyed included the north side of Modbury village other residential land and farm buildings roads farm buildings and a few small areas of woodland

Climate

68 The following data is taken to represent the site

Table 8 Climatic Interpolations Modbury

Grid Reference		SX 643 518	SX 664 523	SX 651 517
Altitude (m)		20	90	45
Accumulated Temperature (day °C)		1602	1521	1573
Average Annual Rainfall (mm)		1075	1236	1117
Overall Climatic Grade		1	2	1
Field Capacity Days		218	244	225
Moisture deficit (mm)	Wheat	100	83	95
	Potatoes	93	70	86

69 At this site the 225 FC Day boundary was found to follow the contour between approximately 40 and 50 m mainly into the lower end of the valley of Sheepham Brook below Edmeston Farm

Relief

70 Altitude ranges from around 20 m in the south west of the site to around 85 m at the tops of hills in the three corners of the site and also 90 m on a hill just to the north east of the village Slopes are mainly gentle or moderate and not limiting but the site is generally undulating with long hill slopes and valley sides which frequently have stronger slopes limiting the land to Subgrade 3b or occasionally moderately steep slopes limiting to Grade 4 One small area to the south east of the village was found to be steeply sloping limiting this area to Grade 5

Geology and Soils

71 The underlying geology of the site is shown on the published geology map (IGS 1974) as mainly Lower Devonian slate The Meadfoot Group (slates with grit) and Staddon Grits (grits and slates) are shown running through the centre of the site and Middle Devonian slate are found north of the Sheepham Brook A narrow band of igneous schalsteins and tuffs runs along the top of this ridge This was largely borne out by the current survey although the deposits themselves are variable and the significance to ALC is frequently obscured by local variations of depth texture and degree of weathering However the area shown as Staddon Grits was shown to have significantly lighter topsoil textures leading to the identification of Subgrade 3a even in an area with more 225 FC Days

72 Soils were mapped by the soil survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as mainly Denbigh 2 and Trusham Associations Denbigh 2 Association is described as comprising well drained fine loamy soils over slate or slate rubble whereas Trusham Association is described as comprising well drained fine loamy soils over deeply weathered basic igneous and metamorphic rock This was partly borne out by the current survey most particularly on the higher slopes but auger borings also found several areas with slowly permeable subsoils which would be more appropriately included in other associations

Agricultural Land Classification

73 The distribution of ALC grades found by the current survey is shown on the accompanying 1 20 000 scale map and areas are summarised in Table 4 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

74 The main area of Subgrade 3a has been identified to the north of Modbury village running along a ridge underlain by deposits of Staddon Grits Topsoil was found to be medium clay loam confirmed by 2 PSD analyses which at Wetness Class I indicates

75 Other small areas shown as Subgrade 3a include those around ASP 17 and at ASP 34 where heavy clay loam topsoil at Wetness Class I indicates a limitation due to restricted workability with less than 225 FC Days as these areas are both below the 225 FC Day boundary

Subgrade 3b

76 The main area shown as Subgrade 3b lies above the 225 Day boundary and was found to be mainly heavy clay loam topsoil at Wetness Class I limited by restricted workability as illustrated by Pit 1 or at Wetness Class II with gleying evident between 40 and 70 cm as illustrated by Pit 2 and limited primarily by wetness Other similar profiles are also found on the strongly sloping hill slopes with gradients of 8 to 11° in which case they may have been recorded as primarily limited by gradient

77 Around Weeke Farm several isolated borings were found to be Subgrade 3a with medium clay loam topsoil at Wetness Class I but these have been included within the areas shown as Subgrade 3b as they do not form a consistent mapping unit

Grade 4

78 The area shown as Grade 4 was found to be mainly limited by wetness mainly heavy clay loam at Wetness Class IV with a slowly permeable layer in the middle subsoil and gleying above 40 cm This is illustrated by Pit 4 at Yealmpton Grade 4 is also given by Wetness Class III with heavy clay loam topsoil and such profiles are illustrated by Pit 2 at Yealmpton and Pit 1 at Ermington

79 Smaller areas of Grade 4 were found to be limited by gradient particularly between Sheepham bridge and Edmeston Farm on the steeper valley sides of the Sheepham Brook

Grade 5

80 The small area of Grade 5 was found to be limited by gradient with slopes of just over 20°

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9 December 1998

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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 (Hodgso n 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

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