8FCS 6267

4/94

Mid Devon District Plan

AGRICULTURAL LAND CLASSIFICATION REPORT OF SURVEY

Resource Planning Team
Taunton Statutory Unit

January 1994

ADAS

MID DEVON DISTRICT PLAN

AGRICULTURAL LAND CLASSIFICATION

Report of Surveys

1 SUMMARY

Land in Mid Devon District at four settlements was surveyed using the Agricultural Land Classification (ALC) System in January 1994 and July 1991 in the case of Tiverton The surveys were carried out on behalf of MAFF as part of its statutory role in the preparation of the Mid Devon District Plan Land at Collumpton Copplestone Crediton and Tiverton was surveyed

The fieldwork was carried out by ADAS (Resource Planning Team Taunton Statutory Unit) at a scale of 1 10 000 The information is correct at the scale shown but any enlargement would be misleading

The distribution of ALC grades and categories identified in the survey areas are detailed below and illustrated on the accompanying ALC maps

Distribution of ALC grades Week Farm, Collumpton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
1	10 5	80 8	84 0
2	1 4	10 8	11 2
3a	0 6	4 6	4 8
Non Agric	0 2	1 5	100%
Agric Bdgs	0 3	2 3	(12 5ha)
TOTAL	13 0	100%	

Distribution of ALC grades Copplestone

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
2	4 2	30 2	31 1
3a	3 5	25 2	25 9
3b	5 8	41 7	43 0
Urban	0 3	2 2	100%
Agric Bdgs	0 1	0 7	(13 5ha)
TOTAL	13 9	100%	

Distribution of ALC grades Crediton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
3a	3 2	72 7	100
Non Agric	1 2	27 3	100%
TOTAL	4 4	100%	(3 2ha)

Distribution of ALC grades Tiverton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
1	3 6	10 1	10 3
2	22 7	63 7	65 2
3a	2 6	7 3	7 5
3b	5 7	16 0	16 4
4	0 2	0 6	0 6
Urban	0 2	0 6	100%
Non Agric	0 2	0 6	(34 8ha)
Agric Bdgs	0 4	1 1	
TOTAL	35 6	100%	

2 INTRODUCTION

Land in Mid Devon District at four settlements was surveyed using the Agricultural Land Classification (ALC) System in January 1994 and July 1991 in the case of Tiverton The surveys were carried out on behalf of MAFF as part of its statutory role in the preparation of the Mid Devon District Plan Land at Collumpton Copplestone Crediton and Tiverton was surveyed

The fieldwork was carried out by ADAS (Resource Planning Team Taunton Statutory Unit) at a scale of 1 10 000 (approximately one sample point every hectare) The information is correct at this scale but any enlargement would be misleading The findings of the surveys and the distribution of the grades are detailed below for each area surveyed

The recent surveys supersede any previous surveys and were undertaken to provide a more detailed representation of the agricultural land quality 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 120cm of the soil profile A description of the grades used in the ALC System can be found in Appendix 2

3 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 obtained for each site by interpolation from the Agricultural Climate Dataset (Meteorological Office 1989) The data are shown in later sections

The parameters used for assessing overall climatic conditions are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness) Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat (MDW) and potatoes (MDP) are also shown These data are used in assessing the soil wetness and droughtiness limitations referred to in later sections A description of the Wetness Classes used in quantifying the degree of wetness can be found in Appendix 3

4 COLLUMPTON

4 1 Thirteen hectares of land at Collumpton around Week Farm were surveyed in January 1994 ALC information is available on the national one inch to the mile ALC map series sheet 176 (MAFF 1972) The area had also been surveyed in 1984 at a scale of 1 25 000 and using the original guidelines but

both scales are considered inadequate for local plan purposes and the area has been resurveyed using the Revised Guidelines The recent survey now supercedes any previous ALC information A total of 14 auger borings and one soil profile pit were examined

4 2 Climate

Climate data for the site was interpolated as described in Section 3 The results are shown in Table 1 and indicate that there is no overall climatic limitation for the site

Table 1 Climatic Interpolations Week Farm, Collumpton

Grid Reference	ST 034 078	ST 031 078
Altitude (m)	57	50
Accumulated Temperature (day deg)	1526	1534
Average Annual Rainfall (mm)	935	930
Overall Climatic Grade	1	1
Field Capacity Days	191	190
Moisture Deficit Wheat (mm)	98	99
Moisture Deficit Potatoes (mm)	89	90

4 3 Relief and Landcover

The site occupies a very gently sloping area at about 55m AOD At the time of survey all the land was in grass with part of the area recently reseeded

4 4 Geology and Soils

The published 1 50 000 scale solid and drift geology map sheet 310 (Geological Survey of England and Wales 1974) shows the site to be underlain by Permian and Triassic lower marls

The Soil Survey of England and Wales mapped the soils in the area in 1983 at a reconnaissance scale of 1 250 000 The area is mapped as the Wigton Moor Association These soils are described as permeable fine and coarse loamy soils variably affected by groundwater the drier soils being on slightly raised sites

The recent survey found soils that were generally uniform across the site The soils were light in texture typically fine sandy loams to depth Occasionally at depth sandier soils were found The soils show some evidence of remaining wet for part of the year There is an area of heavier more poorly drained soils in the north of the site In the south of the site the soils have heavier textured topsoils than found elsewhere on the site

4 6 Agricultural Land Classification

The distribution of ALC grades identified in the survey area is detailed in Table 2 and shown on the accompanying ALC map The information is correct at the scale shown but any enlargement would be misleading

Table 2 Distribution of ALC grades Week Farm, Collumpton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
1	10 5	80 8	84 0
2	1 4	10 8	11 2
3a	0 6	4 6	4 8
Non Agric	0 2	1 5	100%
Agric Bdgs	0 3	2 3	(12 5ha)
TOTAL	13 0	100%	

Grade 1

The majority of the site has been mapped as Grade 1 The soils in these areas are light textured Typically there are fine sandy loams throughout the profile but in some areas there are lighter loamy fine sands at depth Fine sand has a better moisture retention than medium sand and the soils at this site are thus able to hold sufficient water for the soils to be Grade 1 Most of the soils show some evidence that there is waterlogging for part of the year However this raised groundwater level will drain away quickly when conditions allow and there is little effect on the versatility of the soils The soils are Wetness Class I

Grade 2

A small area of Grade 2 has been mapped Within this area the topsoil texture of the soil is heavier than in the Grade 1 area Also found in this area is the site of an old slurry pit where the soil horizons have been disturbed and the versatility of the land is slightly reduced by heavier textures in the soil profile

Subgrade 3a

A small area of Subgrade 3a soils was found in the north of the site Here the subsoil is much heavier in texture than elsewhere on the site and at depth is slowly permeable This inhibits free drainage of the soil and the versatility of the soil is thus reduced The soils are Wetness Class III

Other Land

Close to Week Farm there is an area of farm buildings and an area of non agricultural land

5 COPPLESTONE

5 1 Fourteen hectares of land at two sites at Copplestone were surveyed in January 1994 The two sites were at Sharphay and Dullings The only existing ALC information for the areas is from the one inch to the mile national ALC map series sheet 175 (MAFF 1974) The scale of the map is considered inadequate for local plan purposes and the areas have been resurveyed The recent survey now supersedes any previous ALC information A total of 15 auger borings and one soil profile pit were examined

5 2 Climate

Climatic data for the sites was interpolated as described in Section 3 The results are shown in Table 3 and indicate that there is no overall climatic limitation for the site

Table 3 Climatic Interpolations Copplestone

Grid Reference	ST 765 032	ST 775 026
Altitude (m)	107	115
Accumulated Temperature (day deg)	1477	1468
Average Annual Rainfall (mm)	962	952
Overall Climatic Grade	1	1
Field Capacity Days	197	195
Moisture Deficit Wheat (mm)	93	93
Moisture Deficit Potatoes (mm)	82	82

5 3 Relief and Landcover

The site at Sharphay is gently sloping to the east at a height of 107m AOD The fields were in grass at the time of survey

The site at Dullings forms part of a valley with a small stream flowing east west through the centre The lowest part of the site is at 107m AOD and the land rises to 137m AOD The slopes have gradients which exceed 7 degrees in parts of the site At the time of survey the northern and eastern fields had winter cereals and the other fields were in grass

5 4 Geology and Soils

The published 1 63 360 scale solid and drift geology map sheet 324 (Geological Survey of England and Wales 1969) shows that the Dullings site is underlain by Bow Conglomerate The Sharphay site is underlain by mainly sandstone from the Bude Formation although there are some shales in the northern part of the site also from the Bude Formation

The Soil Survey of England and Wales mapped the soils in 1983 at a reconnaissance scale of 1 250 000 The Dullings site is mapped as the

Crediton soil Association These soils are described as well drained gritty loamy soils over Breccia and locally less stony The majority of the Sharphay site is mapped as the Neath soil Association although there is a small area beside the railway mapped as the Hallsworth 2 Association Neath soils are described as well drained fine loamy soils often over rock There may be small patches of similar soils with slowly permeable subsoils and slight seasonal waterlogging The Hallsworth 2 soils are described as slowly permeable seasonally waterlogged clayey fine loamy and fine silty soils

During the recent survey the soils at the Dullings site fell into two types Poorly drained soils with slowly permeable lower subsoils were found in the central area These soils had increasing stone contents with depth and the clay content of the soil also increased with depth The topsoil in this area is a medium clay loam The second soil type also had increasing stone content with depth but the soils were well drained The topsoil texture of these soils is also medium clay loam

The soils at the Sharphay site were poorly drained caused by slowly permable subsoils The drainage limitation of these soils is variable The soils are virtually stone free

5 5 Agricultural Land Classification

The distribution of ALC grades identified in the survey areas is detailed in Table 4 and shown on the accompanying ALC map The information is correct at this scale but any enlargement would be misleading

Table 4 Distribution of ALC grades Copplestone

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
2	4 2	30 2	31 1
3a	3 5	25 2	25 9
3b	5 8	41 7	43 0
Urban	0 3	2 2	100%
Agric Bdgs	0 1	0 7	(13 5ha)
TOTAL	13 9	100%	

Grade 2

The soils mapped as Grade 2 are well drained and are Wetness Class I The topsoil texture of the soils is medium clay loam The soils are limited to Grade by a workability limitation The soils are stony but this does not impose a droughtiness limitation greater than that imposed by the combination of topsoil texture and the number of days that the soil is at field capacity the workability limitation

Subgrade 3a

These soils have a wetness limitation The poor drainage is caused by the presence of slowly permeable lower subsoils The soils are Wetness Class II and III The Wetness Class II soils have no slowly permeable layer within 80cm but are gleyed suggesting that there is not free drainage of the soils These soils had medium clay loam topsoils Parts of the site also had more poorly drained soils with slowly permeable lower subsoils These Wetness Class III soils have medium clay loam topsoils Both these soil types qualify for Subgrade 3a The soils are virtually stoneless

Subgrade 3b

The areas mapped as Subgrade 3b are poorly drained soils These soils have slowly permeable lower subsoils and are Wetness Class IV A soil pit was dug to confirm the presence of the slowly permeable layer in terms of its structure and porosity These soils at the Dullings site are stony The stone content increases with depth but there is no droughtiness limitation The topsoil texture of these soils is a medium clay loam Parts of the Dullings site have gradients over 7 degrees but less than 11 degrees These areas are also limited to Subgrade 3b by the gradient as well as the wetness limitation

Other Land

The site of the old slaughter house has been mapped as urban because the land still has much rubble and concrete hard standing There are agricultural buildings at both sites

6 CREDITON

6 1 Four hectares of land at Alexandra Road were surveyed in January 1994 ALC information is available for the area on the one inch to the mile national ALC map series sheet 176 (MAFF 1972) The area had also been surveyed in 1988 but using the original guidelines for classifying agricultural land The areas has been resurveyed to provide a more accurate representation of the land quality within the site The recent survey now supersedes any previous ALC information A total of 4 auger borings and one soil profile pit were examined

6 2 Climate

Climate data for the site was interpolated as described in Section 3 The results are shown in Table 5 and indicate that there is no overall climatic limitation for the site

Table 5 Climatic Interpolations Crediton

Grid Reference	ST 827 008
Altitude (m)	125
Accumulated Temperature (day deg)	1456
Average Annual Rainfall (mm)	953
Overall Climatic Grade	1
Field Capacity Days	194
Moisture Deficit Wheat (mm)	93
Moisture Deficit Potatoes (mm)	82

6 3 Relief and Landcover

The site is on sloping land The highest land is in the north at a height of 135m AOD and the lowest land in the south is at 100m AOD The maximum gradient measured was 6 degrees At the time of survey all the agricultural land was in grass

6 4 Geology and Soils

The published 1 50 000 scale drift geology map sheet 325 (Geological Survey of England and Wales 1986) shows the whole site to be underlain by breccia and conglomerates from the Triassic and Permian eras

The Soil Survey of England and Wales mapped the soils of the area in 1972 at a scale of 1 63 360 The site at Crediton was included in the unsurveyed area predominantly considered to be urban To the north of the site the Crediton Series soils were mapped These soils are described as well drained gritty reddish loamy soils over breccia

The soils found in the recent survey were similar to the Crediton Series The soils were well drained and stony

6 5 Agricultural Land Classification

The distribution of ALC grades identified in the survey area is detailed in Table 6 and shown on the accompanying ALC map The information is correct at the scale shown but any enlargement would be misleading

Table 6 Distribution of ALC grades Crediton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
3a	3 2	72 7	100
Non Agric	1 2	27 3	100%
TOTAL	4 4	100%	(3 2ha)

Subgrade 3a

All of the agricultural land has been mapped as Subgrade 3a The soils are Wetness Class I and have medium clay loam topsoils The subsoils are clays The soils are reddish The stone content of the soil is relatively high but the stones are all less than 2cm in size The stone content of the topsoil was measured by sieving and displacement at a soil profile pit and found to be 27% The subsoil stone contents rose to around 40% These soils have a droughtiness limitation caused by the stone content of the soil

Other Land

Part of the site forms the grounds of a large house and this has been all mapped as non agricultural

7 TIVERTON

7 1 Thirty six hectares of land at Tiverton were surveyed at three sites in July 1991 as part of the preparation of the Tiverton Local Plan in a survey which covered an area of 128 hectares The only existing ALC information is from the one inch to the mile ALC map series sheet 176 (MAFF 1976) The scale of this map is considered inadequate for local plan purposes and the area was resurveyed The 1991 survey supersedes any previous ALC information A total of 117 auger borings and 5 soil profile pits were examined in the whole area of which 41 borings were in the current areas of interest

6 1 Climate

Climatic data for the sites were interpolated as described in Section 3 The results are shown in Table 7 and indicate that there is no overall climatic limitation for the sites

Table 7 Climatic Interpolation Tiverton

Grid Reference	SS 968 132	SS 980 118
Altitude (m)	70	114
Accumulated Temperature (day deg)	1510	1460
Average Annual Rainfall (mm)	1021	1020
Overall Climatic Grade	1	1
Field Capacity Days	210	208
Moisture Deficit Wheat (mm)	90	85
Moisture Deficit Potatoes (mm)	79	72

7 3 Relief

The Pool Anthony site is virtually flat at a height of 90m AOD However the Great Gornhay site has some microrelief and steeper slopes in the south It is

Grade 1

The soils in this area are well drained and are Wetness Class I The topsoils are fine sandy silt loams which overlie deep medium clay loams The stone content of the soils is low The soils do not experience a workability limitation and are Grade 1

Grade 2

The Grade 2 soils at Tidcombe are well drained Wetness Class I soils with medium clay loam topsoils These soils have a slight workability limitation imposed by the slightly heavier topsoil than those described above The Grade 2 soils at Pool Anthony are similar but have higher stone contents in places The areas mapped as Grade 2 at Great Gornhay show slight evidence of wetness in the lower subsoil but the soils are still Wetness Class I (the profile is not gleyed) These soils have a slight workability limitation imposed by the medium clay loam topsoils

Subgrade 3a

These soils show clear evidence of gleying caused by shallow waterlogging for significant periods of the year The soils do not have slowly permeable layers The soils are Wetness Class III with medium clay loam topsoils These soils are downgraded by a wetness limitation

Subgrade 3b

In the south west corner of the Tidcombe site there are slopes with gradients between 7 and 11 degrees which are downgraded to 3b The other area of 3b at this site has a more severe wetness limitation than the 3a areas These soils have slowly permeable subsoils and are Wetness Class IV At the Great Gornhay site there is an area where microrelief causes the versatility of the land to be much reduced and the land is downgraded The other larger area of 3b is downgraded on the basis of limiting gradients

Grade 4

The small area of Grade 4 has gradients of 13 degrees which limits the versatility of the land significantly

Other land

Land associated with Little Tidcombe has been mapped as appropriate to its land use

at a height of 70m AOD The southern site slopes to the north down to the Grand Western Canal This site has a height range of 90m to 120m

7 4 Geology and Soils

The published 1 50 000 scale soils and drift geology map sheet 310 (Geological Survey of England and Wales 1974) shows the Great Gornhay site has a spur of Lower Sandstone running south west- north east through the site with drift deposits on either side To the north there is alluvium and to the south valley gravels The majority of the Pool Anthony site consists of valley gravels although there are small areas of the Lower Sanstone in the nort west and south east corners There is a smooth boundary running east to west through the middle of the Tidcombe site with Lower Sandstone to the north and breccia and conglomerates to the south

The Soil Survey of England and Wales mapped the soils of the area in 1983 at a reconnaissance scale of 1 250 000 The eastern part of the Gornhay site is mapped as the Hollington Association while the western part is unsurveyed The Pool Anthony site is mapped as the Newnham Association and the Tidcombe site is the Bromsgrove Association Hollington soils are described as deep stoneless reddish fine silty and clayey soils variably affected by groundwater Newnham soils are described as well drained reddish coarse and fine loamy soils over gravel Bromsgrove soils are described as well drained reddish gritty coarse loamy soils mainly over soft sandstone but deep in places There may be assocaiated fine loamy soils with slowly pemeable subsoils and slight seasonal waterlogging

7 5 Agricultural Land Classification

The distribution of ALC grades identified in the survey areas is detailed in Table 8 and shown on the accompanying ALC map The information is correct at the scale shown but any enlargement would be misleading

Table 8 Distribution of ALC grades Tiverton

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
1	3 6	10 1	10 3
2	22 7	63 7	65 2
3a	2 6	7 3	7 5
3b	5 7	16 0	16 4
4	0 2	0 6	0 6
Urban	0 2	0 6	100%
Non Agric	0 2	0 6	(34 8ha)
Agric Bdgs	0 4	1 1	
TOTAL	35 6	100%	

APPENDIX 1

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1969) Solid and Drift edition Sheet 324 Okehampton 1 63 360 scale

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1974) Solid and Drift edition Sheet 310 Tiverton 1 50 000 scale

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1986) Drift edition Sheet 325 Exeter 1 50 000 scale

MAFF (1972) Agricultural Land Classification Map sheet 176 Provisional 1 63 360 scale

MAFF (1974) Agricultural Land Classification Map sheet 175 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) Published climatic data extracted from the agroclimatic dataset compiled by the Meteorological Office

SOIL SURVEY OF ENGLAND AND WALES (1972) Sheet 325 and 339 1 63 360 scale

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

APPENDIX 2

DESCRIPTION OF THE 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 land cover types eg buildings in large grounds and where map scale permits the cover types 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 70cm depth for more than 30 days in most years

Wetness Class II

The soil profile is wet within 70cm depth for 31-90 days in most years or if there is no slowly permeable layer within 80cm depth it is wet within 70cm for more than 90 days but not wet within 40cm depth for more than 30 days in most years

Wetness Class III

The soil profile is wet within 70cm depth for 91-180 days in most years or if there is no slowly permeable layer within 80cm depth it is wet within 70cm for more than 180 days but only wet within 40cm depth for between 31 and 90 days in most years

Wetness Class IV

The soil profile is wet within 70cm depth for more than 180 days but not within 40cm depth for more than 210 days in most years or if there is no slowly permeable layer within 80cm depth it is wet within 40cm depth for 91 210 days in most years

Wetness Class V

The soil profile is wet within 40cm depth for 211 335 days in most years

Wetness Class VI

The soil profile is wet within 40cm 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)