Report on Agricultural Land Classification (ALC) at

land at Berden, near Bishops Stortford

Field	Area (Ha)
W	21.4
Nmid	9.1
NE	11.4
S	15.9
E	5.6
Total	63.4 (156.6 ac)

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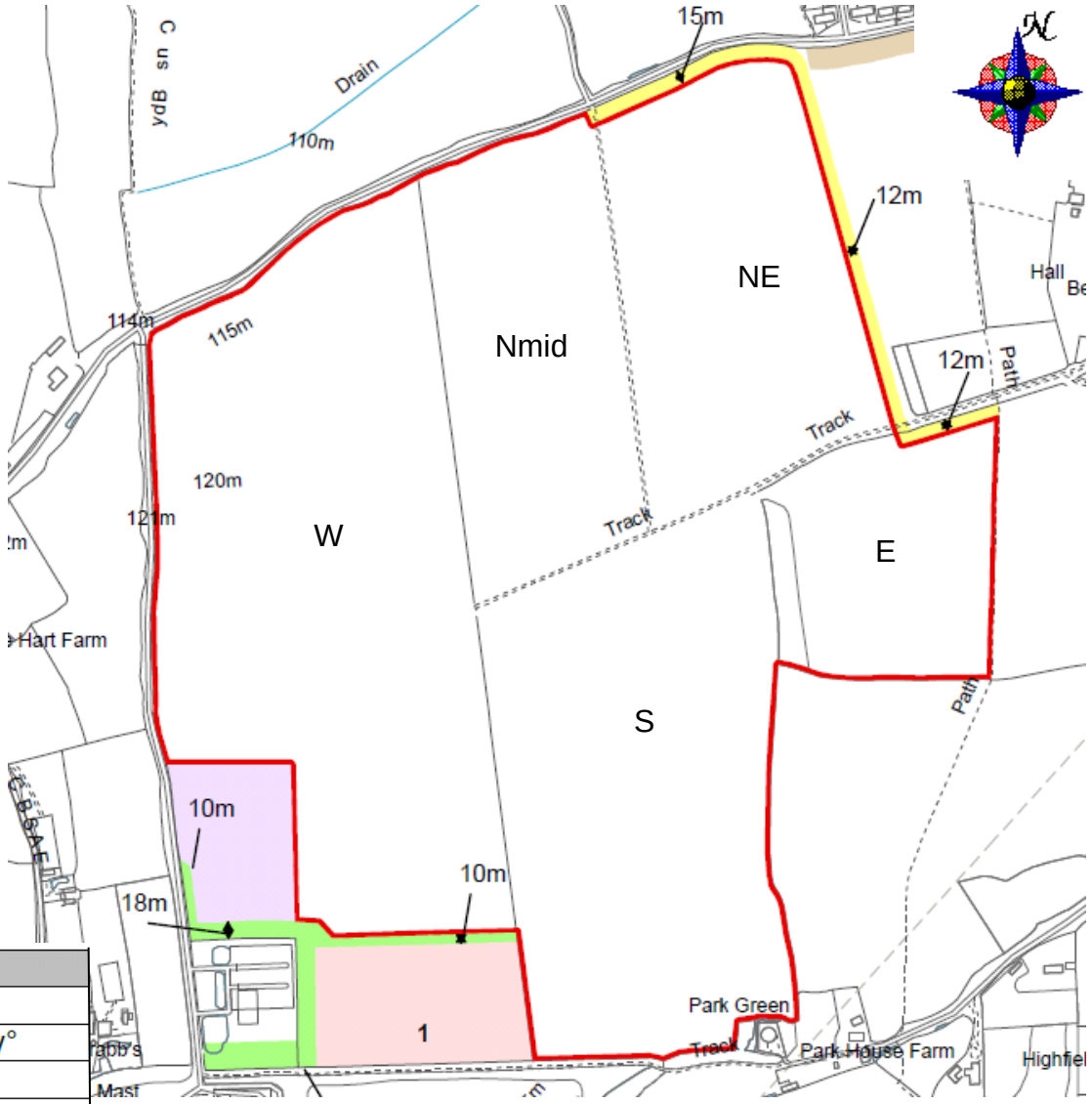
Map 1: Area of land surveyed and agro-climatic data in table below



Parameter	Value
Average Annual Rainfall	624mm
Accumulated Temperatures >0°C	1,352 day°
Field Capacity Days	121 days
Average Moisture Deficit, wheat	109mm
Average Moisture Deficit, potatoes	101mm

The criteria for assessing agricultural land classification (ALC) are taken from guidelines issued by DEFRA or formerly the Ministry of Agriculture, Fisheries & Food in 1988. They are based on assessing grading according to four categories, 1) climatic, 2) site, 3) soil & 4) interactive. The grading is then made according to the most limiting factor. Where these factors vary in the field then assessments are made approximately every 3 hectares & a land classification map of the field is drawn up according to the most limiting factor.

1) Climatic limitations are based on the day °C which is the average daily temperature above 0 °C summed from Jan to June (ATO) & average annual rainfall (AAR). For the location of the Farm, ATO is 1352 day° & AAR is 624 mm. This is a reasonable climate and in an average year would not limit crop growth at all ie grade 1, see map 1 of Agro-climatic data for this area.

2) Site limitations are based on a) gradient, b) microrelief & c) flooding risk.
   a) The gradient on the farm is less than 7° in all directions which means that there is no limitation according to gradient.
   b) The microrelief has no irregularities such as pits or boulders which would limit the grading.

2c) Flooding risk was not assessed over the farm since it requires observations to be made over a number of years. Appendix 2 at the end of this report details the observations required. There was no standing water anywhere on the site apart from tracks. The farmer told me that the land had been drained only about 4 years ago.

3) Soil limitations are based on a) soil depth to consolidated or fragmented rock, b) stoniness & c) chemical status.

a) Soil depth is greater than 60cm although in some places chalk rubble is shallower than that. However this would not limit cultivation or root growth and therefore would not limit the grade of land.

b) Likewise with topsoil stone content. This is generally less than 5% as assessed visually and not requiring measurement.

c) Chemical status that may show up toxicity in the soil is unlikely since in the past the field has only been used for agriculture and any inputs would be for agricultural use and not contain any potential toxicity.

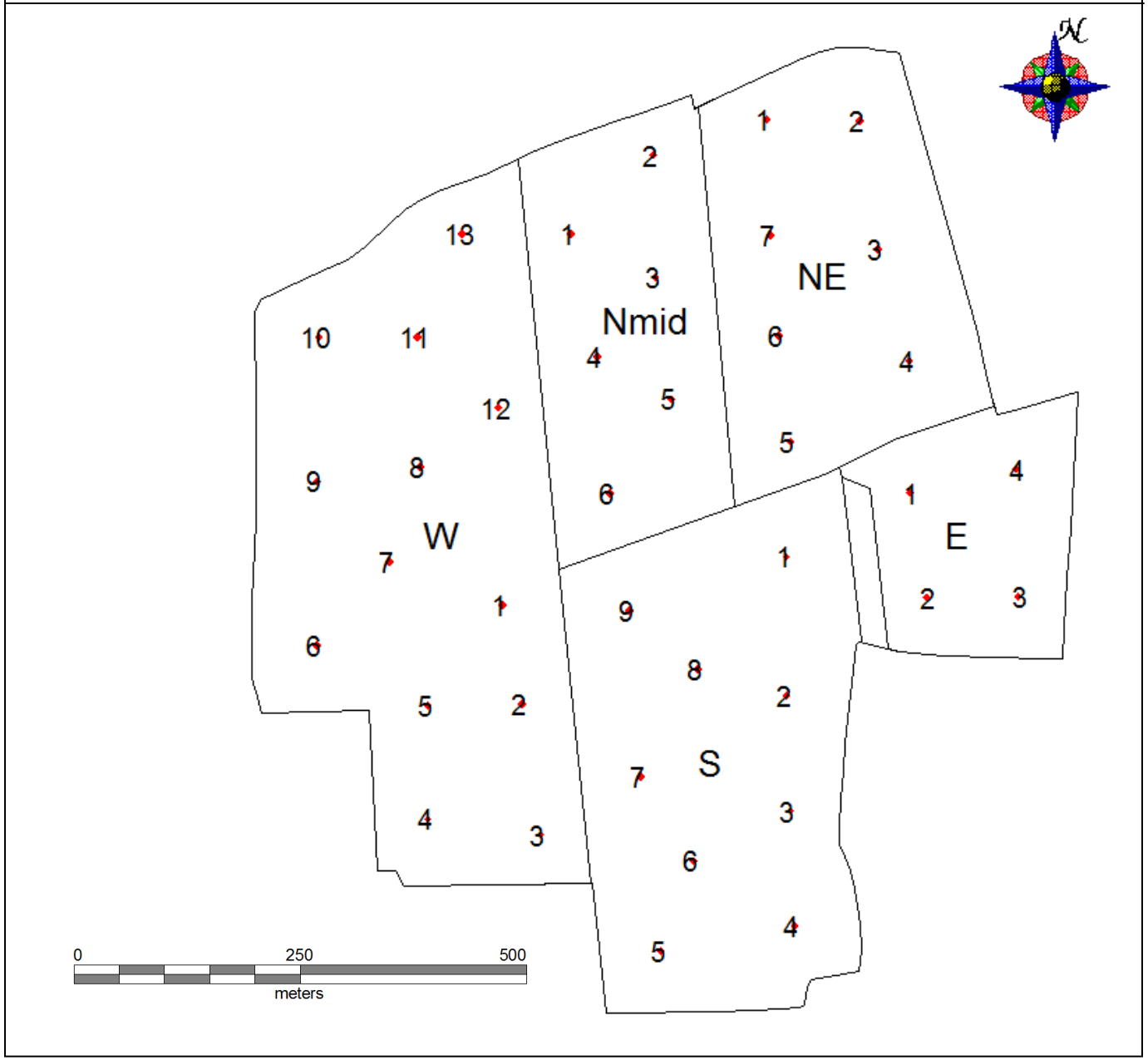
4)Interactive limitations are based on a) droughtiness & b) soil wetness.

a) **droughtiness** is calculated according to available water capacity (AP). This is estimated using standard values of the soil texture, stone content & soil structure at each survey point down to a depth of 120cm for wheat & 70cm for potatoes (figure 1 on page 9 below). Each profile was assessed on a 1cm core taken down to a depth of 80-100cm.

The grading is calculated from the moisture balance for both wheat & potatoes. The moisture balance is the available water capacity minus the climatic moisture deficit for that area. The moisture deficit for this area for wheat is 109mm & for potatoes is 101mm see agro-climatic data on page 3.

Soil type	Grade according to droughtiness
A	2
B	2
C	2
D	2

Map 2: Locations of soil cores down to 80-100cm depth for each field surveyed.



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Soil descriptions

- A
- B
- C
- D

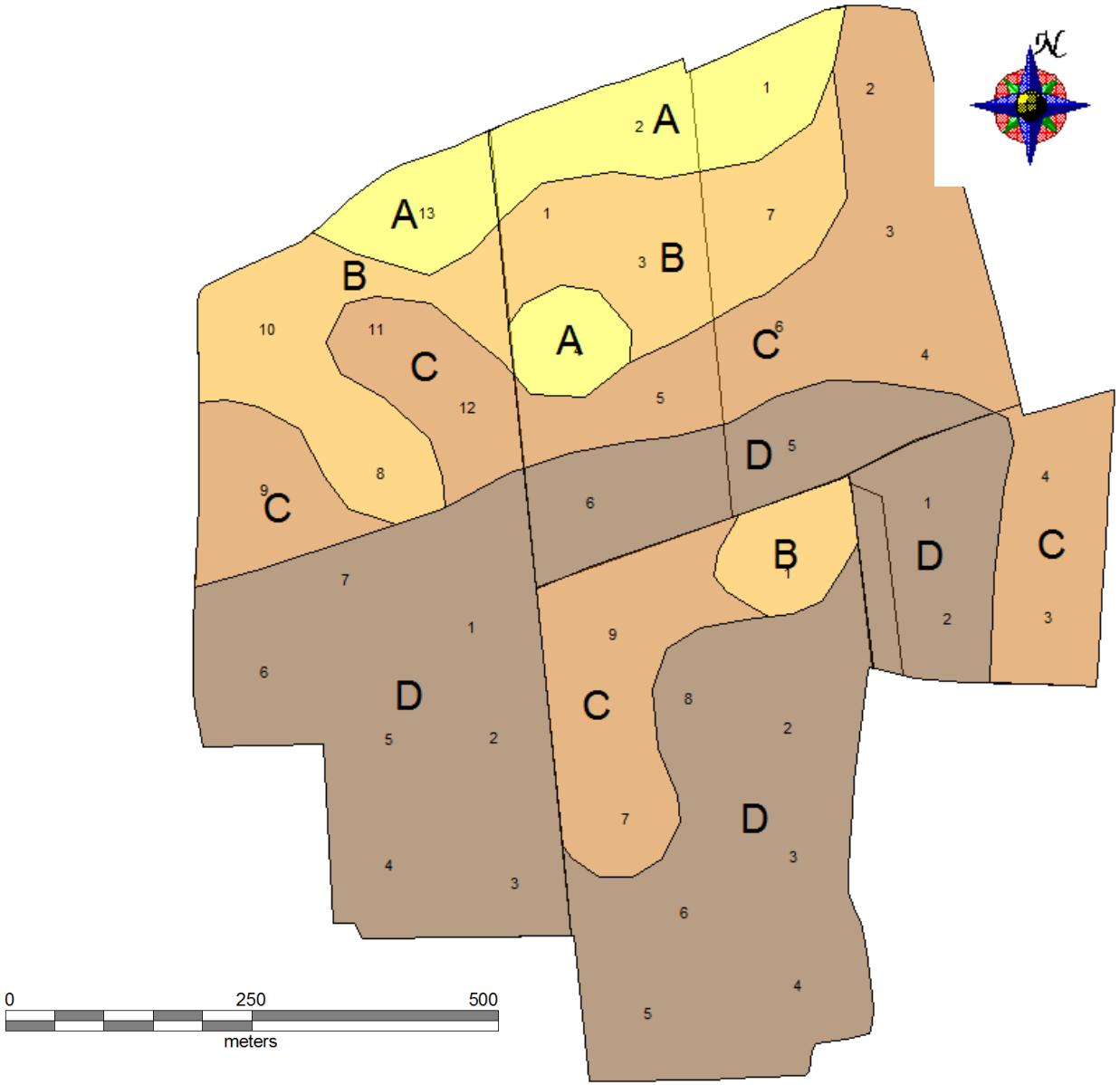
Soils A, B & C
calcareous heavy topsoil over:

A – chalk rubble
B – slowly permeable clay over chalk rubble
C – slowly permeable clay

D- non-calcareous heavy topsoil over slowly permeable clay

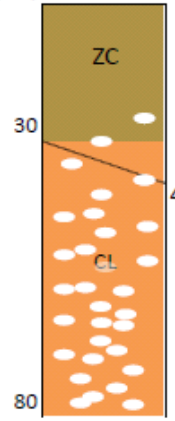
For a fuller description see profile descriptions on next page

Map 3: Soil types for the surveyed area



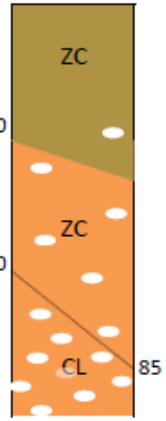
Page 9: Figure 1 –**Soil profile descriptions** and available water estimates (AP) for wheat and potatoes

Soil A



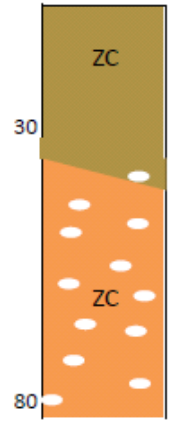
depth (cm)	stones	description	AP wheat TA (0-50)+	AP potatoes TA (0-70cm)
		calcareous		
	3-5%	dark brown silty clay topsoil	495	495
		olive brown		
		chalk rubble (50% chalk) below 30-40cm	291	582
		permeable throughout profile	700	
	3-5%			
			149mm	108mm

Soil B



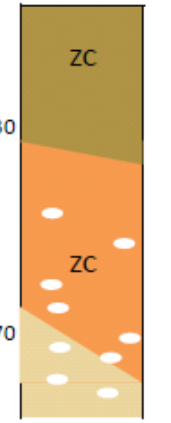
depth (cm)	stones	description	AP wheat TA (0-50)+	AP potatoes TA (0-70cm)
		calcareous		
	3-5%	dark brown silty clay	495	495
		olive brown slightly mottled subsoil		
	3-5%	slowly permeable in places	291	
		contains chalkstones	155	524
	3-5%	chalk rubble below 60-85cm		
		permeable	340	
			128mm	102mm

Soil C



depth (cm)	stones	description	AP wheat TA (0-50)+	AP potatoes TA (0-70cm)
		calcareous		
	3-5%	dark brown silty clay topsoil	495	495
		olive brown		
	3-5%	slightly mottled subsoil with chalkstones below 40-60cm	263	495
		slowly permeable	475	
	3-5%	below 40cm		
			123mm	99mm

Soil D



depth (cm)	stones	description	AP wheat TA (0-50)+	AP potatoes TA (0-70cm)
		non-calcareous		
	3-5%	dark brown silty clay	495	495
		olive brown slightly mottled		
	3-5%	below 35-60cm chalkstones below 55-75cm	233	466
	3-5%	slowly permeable below 40cm olive clay below 60-80cm	475	
			120mm	96mm

Page 10: Figure 2 –**Soil profile descriptions**

Legend for above profiles

CL: clay loam
ZC: silty clay

AP: available water capacity (crop adjusted) (mm)
TA: total available water (mm)
EA: easily available water (mm)

4b) soil wetness class is assessed from

1) the depth to a gleyed (mottled) horizon
2) the depth to a slowly permeable layer
3) the duration of field capacity when no further rain can be held in the soil and it drains out(121 days at this site see Agro-climatic data on page 3).

The photos on pages 12 to 15 show the soil cores at various depths from which the soil wetness class can be derived using the information above.

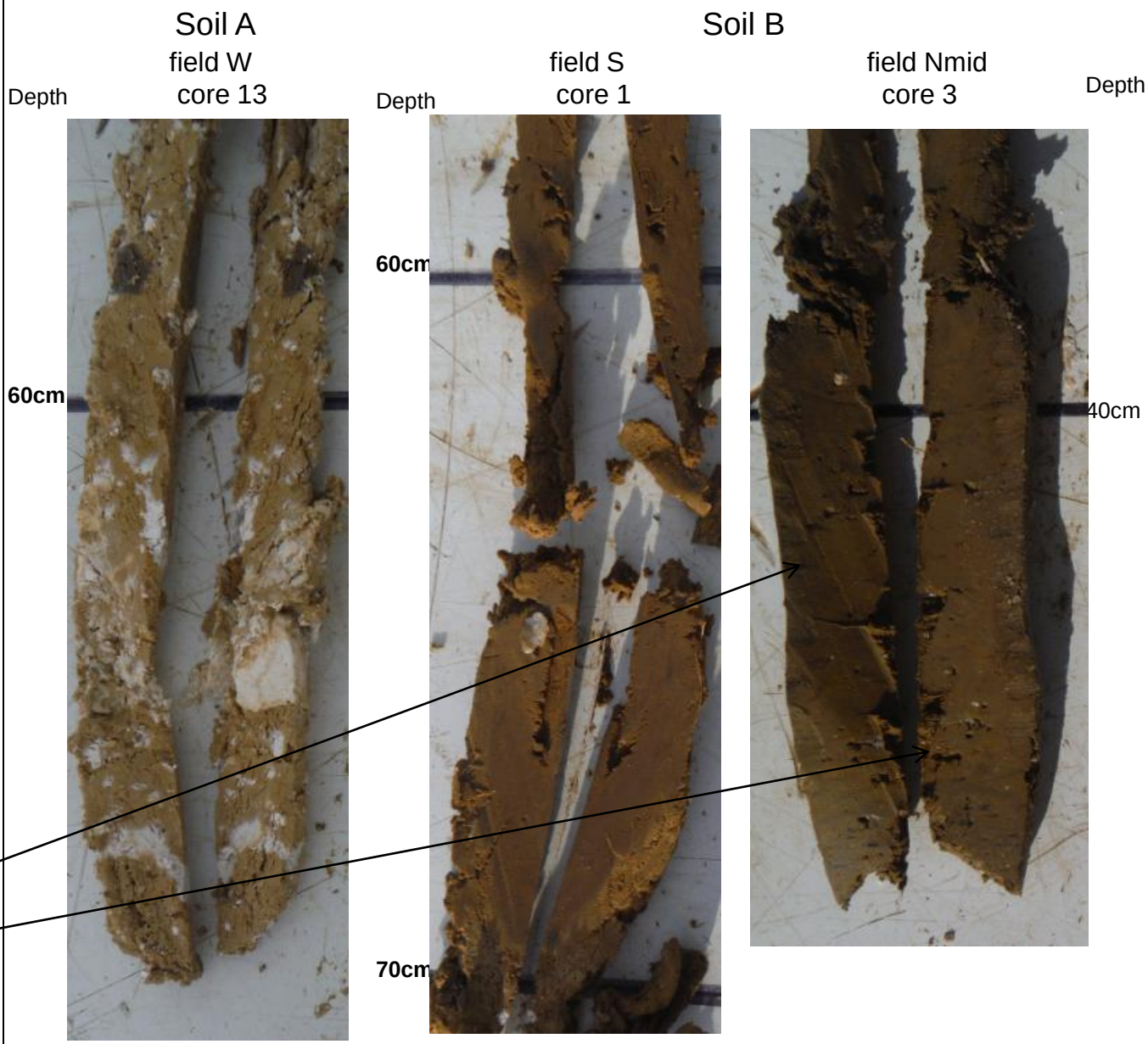
The wetness class for each soil is then plugged into table 1 on page 16. Along with topsoil texture and field capacity days, this is used to obtain the land grade according to wetness. Page 17 summarizes these findings.

Soil A, grade 2
This soil is very much characterised by chalk rubble beginning below 30-40cm. This picture shows the chalk rubble below 60cm. There is almost as much chalk as soil and this ensures that soil A is free draining.

Soil B, core S1 grade 2
As with soil A this soil also contains chalk rubble but it begins lower down below 60cm. This picture shows the absence of mottling above 70cm probably due to the chalk rubble lower down which ensures it is free draining.

Soil B, core Nmid3 grade 2
This core is the same soil as above but not quite as free draining since there is more than 2% mottling beginning below 45cm. They consist of small black manganiferous concretions and some rusty mottles. However it is not sufficient to lower the grade.

Fig 3: Photos of soil cores representative of parts of profiles at different depths for soil types A and B. The profiles are also described more generally on page 9.



Soil B, core W10, grade 3a
There is more mottling (both black manganiferous and rusty) in this core than those for soil B on the previous page. Mottling also begins within 40cm and therefore drainage is not so good and this lowers it to grade 3a. The smooth soil surface shown is one indication of the slowly permeable layer spl which is also evidence for the poorer drainage.

Soil C, core NE2, grade 2
Unlike soil B, soil C has no chalk rubble above 100cm depth. Therefore the drainage is liable to be not so good. However this core has no observable mottling and therefore is better draining and enabling a better grade of 2.

Soil C, core E3, grade 2
This core has some observable mottling (>2%) below 55cm which means it is not as well drained as the core above but the grade of land is still the same.

Fig 4 : Photos of soil cores representative of parts of profiles at different depths for soil types B and C. The profiles are described more generally on page 9.

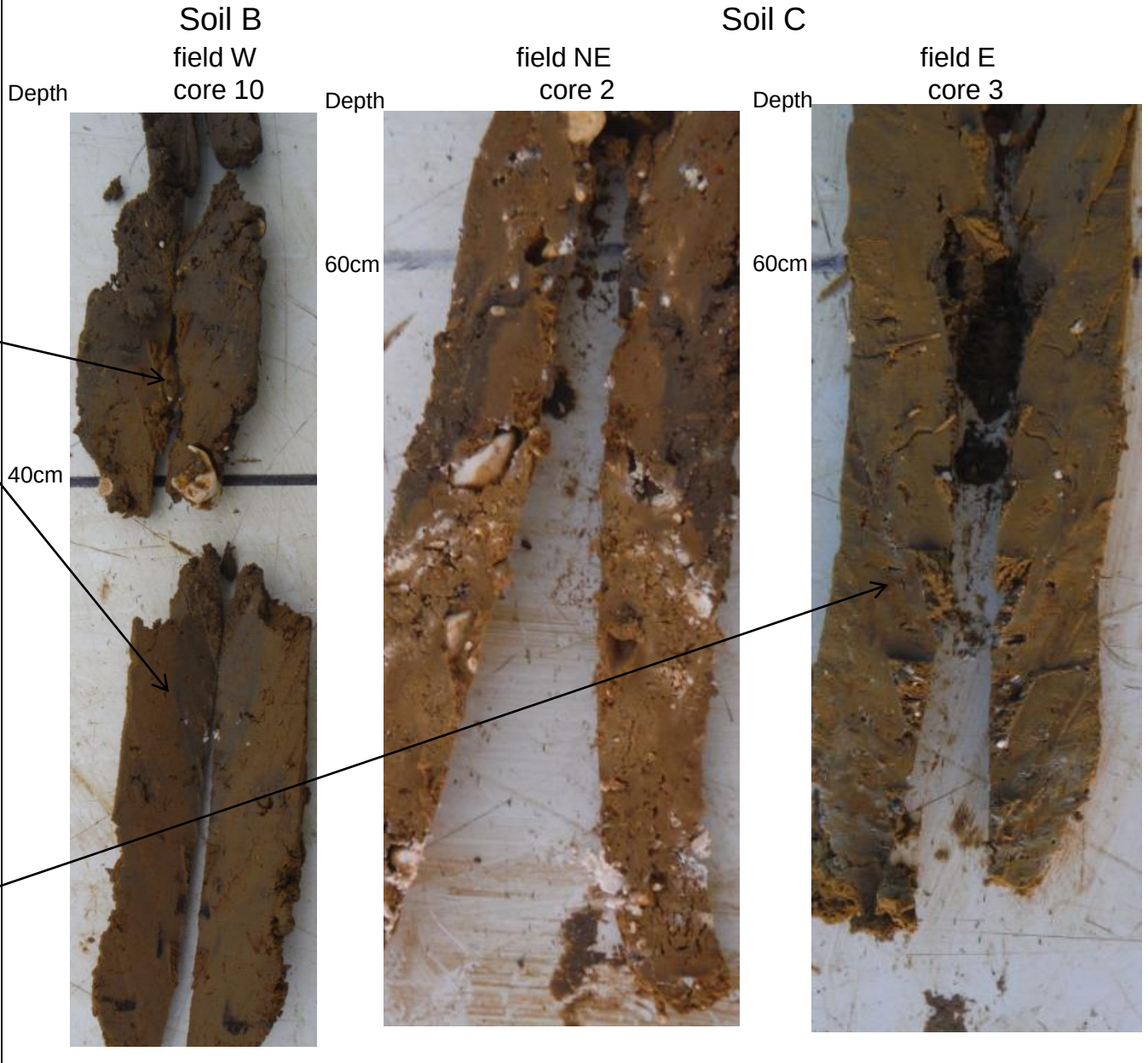
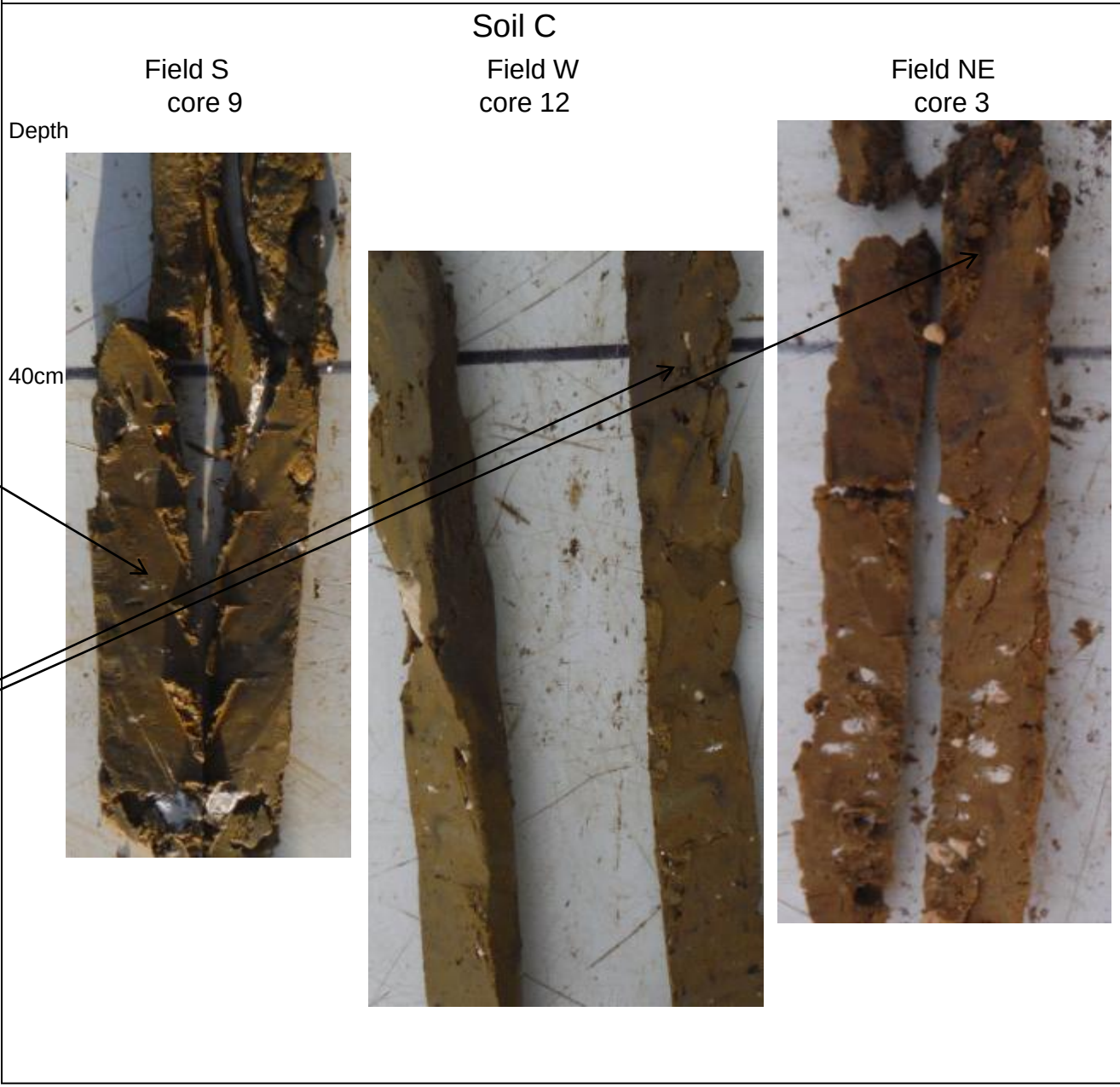


Fig 5 : Photos of soil cores representative of soil C at 40cm depth. The profiles are described more generally on page 9.



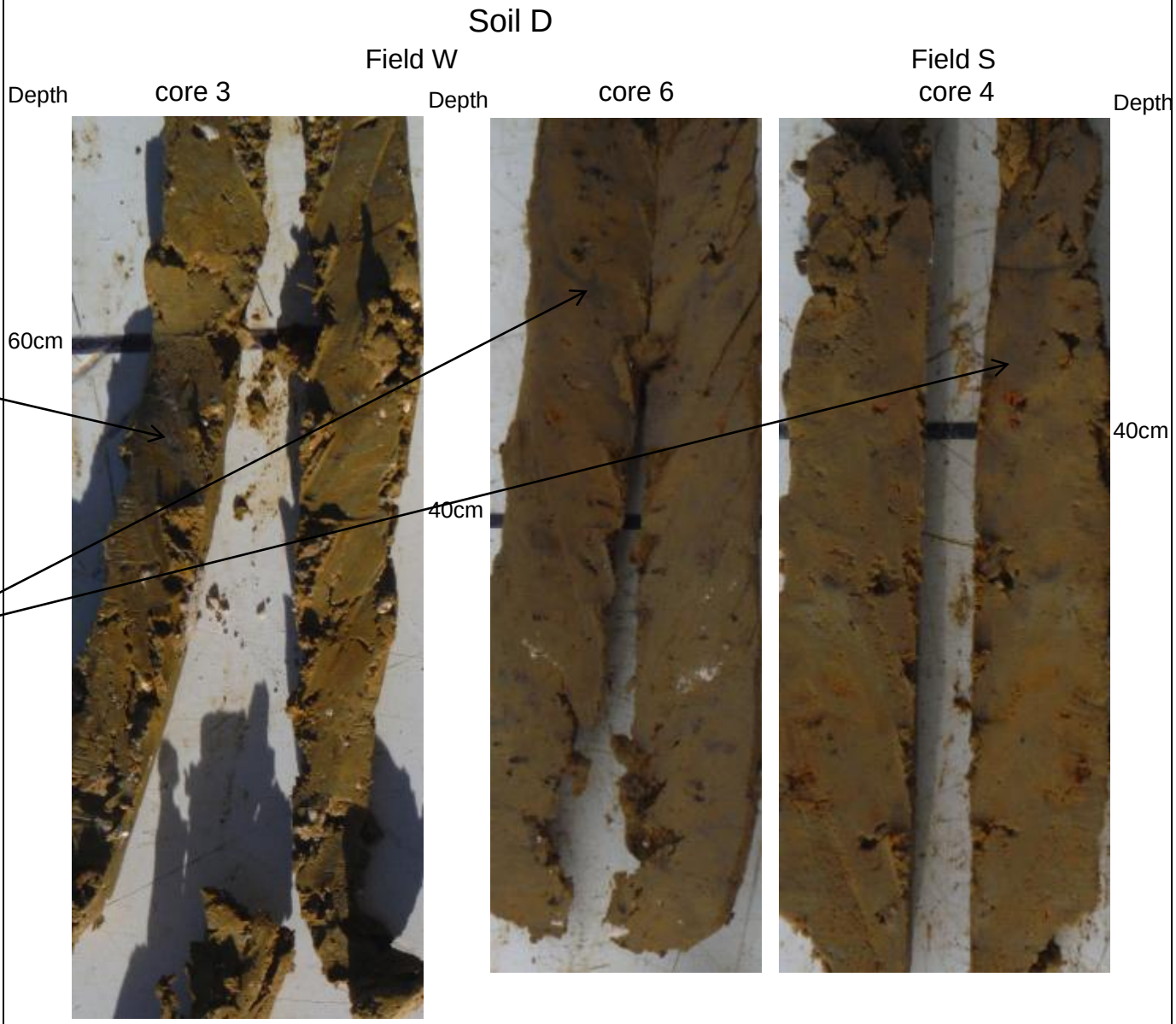
Soil C, core S9, grade 2
Mottling begins at 45cm. This is similar to the previous core E3 where mottling begins between 40 and 70cm. This is indicative of wetness class II.

Soil C, cores W12 & NE3, grade 3a
Both cores are mottled within 40cm with a slowly permeable layer below at least 15cm thick. Therefore this pushes the wetness class down to III and the grade down to 3a.

Soil D, core W3, grade 3a
This soil is the one soil that doesn't have calcareous topsoil. Therefore even though mottling doesn't begin until 60cm and the wetness class is II, the grade is 3a.

Soil D, cores W6 & S4 grade 3b
These 2 cores are examples of the poorest soil on the site ie grade 3b. This is because together with the non calcareous topsoil, mottling begins within 40cm which makes it wetness class III.

Fig 6 : Photos of soil cores representative of parts of profiles between 40 and 60cm depth for soil type D. The profiles are described more generally on page 9.



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Page 16

Page 23 from the Agricultural land classification guidelines of 1988

Soil A is WC I
Soils B & C are WC I, II & III
Soil D is WC II & III

See following page for an explanation of this table

Table 1 – Criteria for grading soil according to wetness

Agricultural Land Classification of England and Wales

Table 6 Grade according to soil wetness - mineral soils

Wetness Class WC	Texture[1] of the top 25 cm	Field Capacity Days <126	126-150	151-175	176-225	>225
I	S[2] LS[3] SL SZL	1	1	1	1	2
	ZL MZCL MCL SCL	1	1	1	2	3a
	HZCL HCL	2	2	2	3a	3b
	SC ZC C	3a(2)	3a(2)	3a	3b	3b
II	S[2] LS[3] SL SZL	1	1	1	2	3a
	ZL MZCL MCL SCL	2	2	2	3a	3b
	HZCL HCL	3a(2)	3a(2)	3a	3a	3b
	SC ZC C	3a(2)	3b(3a)	3b	3b	3b
III	S[2] LS SL SZL	2	2	2	3a	3b
	ZL MZCL MCL SCL	3a(2)	3a(2)	3a	3a	3b
	HZCL HCL	3b(3a)	3b(3a)	3b	3b	4
	SC ZC C	3b(3a)	3b(3a)	3b	4	4
IV	S[2] LS SL SZL	3a	3a	3a	3b	3b
	ZL MZCL MCL SCL	3b	3b	3b	3b	3b
	HZCL HCL	3b	3b	3b	4	4
	SC ZC C	3b	3b	3b	4	5
V	S LS SL SZL	4	4	4	4	4
	ZL MZCL MCL SCL	4	4	4	4	4
	HZCL HCL	4	4	4	4	4
	SC ZC C	4	4	4	5	5
Soils in Wetness Class VI - Grade 5						

[1]For naturally calcareous soils with more than 1% $CaCO_3$ and between 18% and 50% clay in the top 25 cm, the grade, where different from that of other soils, is shown *in brackets*

An explanation of table 1 above

The most limiting agricultural land classification (ALC) factor is soil wetness.

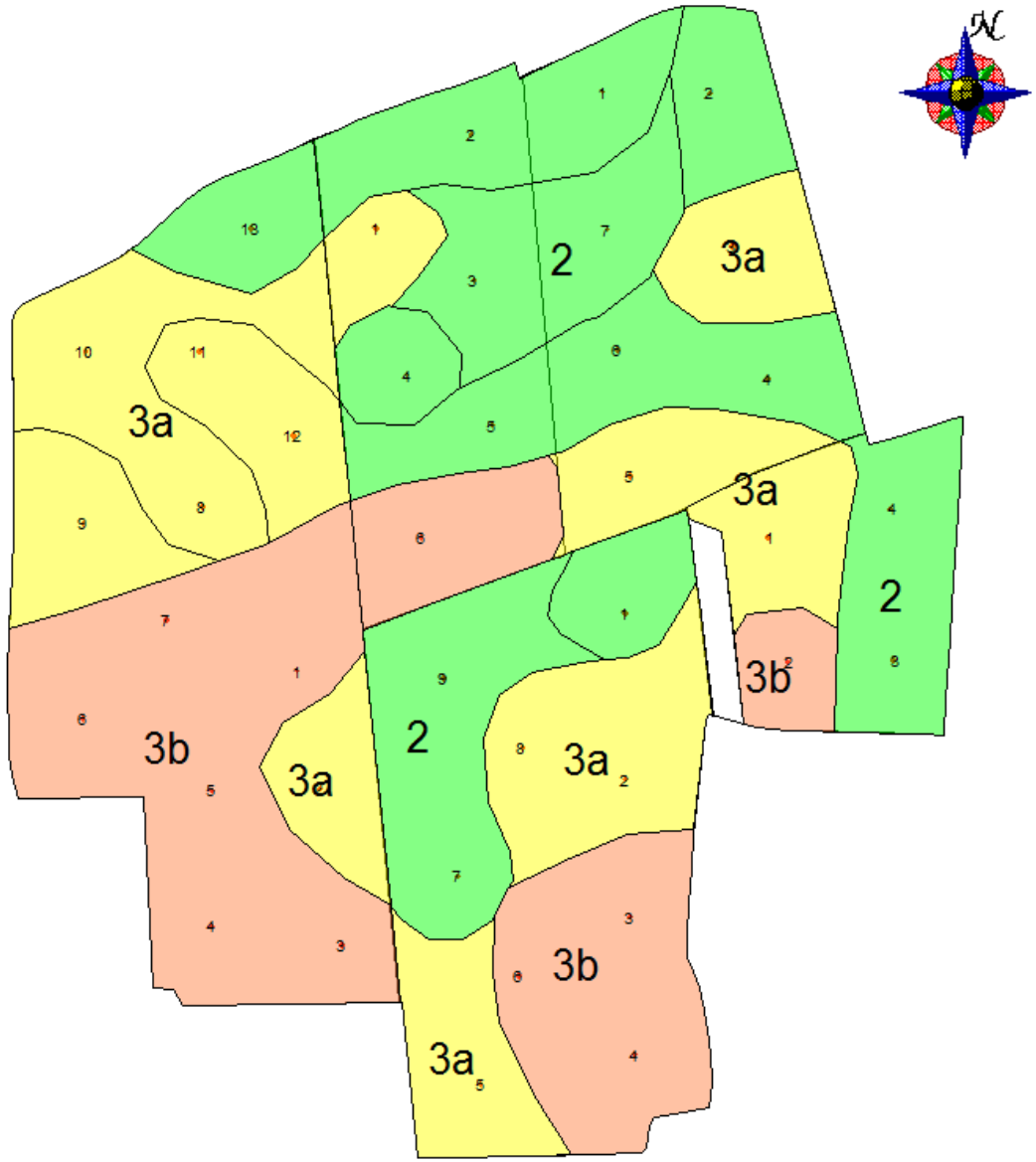
Table 1 on the previous page is used to allocate ALC grade according to:

1. Wetness class (WC I, II or III)
2. Topsoil texture is silty clay (ZC) as assessed in the field by finger texturing.
3. Field capacity days or the number of days in the year that the field is at field capacity. Climatic data give this value as 121 days for this site.

Soil type A is WC I and the calcareous topsoil gives it a grade of 2.
Soil types B and C have a calcareous topsoil. Where the wetness class is I & II then the grade is 2. Where the wetness class is III then the grade is 3a.
Soil type D has a non calcareous topsoil. Where the wetness class is II then the grade is 3a. Where the wetness class is III then the grade is 3b.

ALC grade	%area
2	37%
3a	35%
3b	28%

Map 4 – Limiting agricultural land classification (ALC) grade for the surveyed area



Executive summary for land at Berden

Grades 2 & 3a make up 72% of the site or 45.8ha
Grade 3b makes up 28% of the site or 17.7ha.

Description of the yielding qualities and cropping suitability of the different ALC grades is given in appendix 1 on the next page.

Appendix 1

SECTION 2

DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

Descriptions are also given of other land categories which may be used on ALC maps.

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 includes 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 (e.g. cereals and forage crops) the yields of which are variable. In moist 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.

Appendix 2

Table 2 Grade according to flood risk in summer

Grade/ Subgrade		Flood limits *frequency*	*duration*
1		very rare	short
2		rare	short
3a		very rare	medium or long
	or	rare	medium
	or	occasional	short
3b		rare	long
	or	occasional	medium
4		occasional	long
	or	frequent	short or medium
5		frequent	long

Table 3 Grade according to flood risk in winter

Grade/ Subgrade		Flood limits *frequency*	*duration*
1		rare	short
2		rare	medium
	or	occasional	short
3a		rare	long
	or	occasional	medium
	or	frequent	short
3b		occasional	long
	or	frequent	medium
4		frequent	long

The terms used in Tables 2 and 3 are defined as follows:

Season
summer - mid March to mid November
winter - mid November to mid March

Duration
short - not more than 2 days (48 hours)
medium - more than 2 but not more than 4 days
long - more than 4 days

Frequency
very rare - not more than once in 15 years
rare - once in 10 to once in 14 years
occasional - once in 3 to once in 9 years
frequent - more than once in 3 years